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NAVAL AVIATION'S USE OF SIMULATORS IN THE OPERATIONAL TRAINING ENVIRONMENT: A COST ANALYSIS PERSPECTIVE

by

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June, 1996

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ABSTRACT

The basic objective of this thesis is to identify potential financial savings in operational flight training. There are seventeen communities listed in the Commander U.S. Naval Air Forces Pacific Fleet (CNAP) and Commander U.S. Naval Air Forces Atlantic Fleet (CNAL) Squadron Training Matrices (TRM). The F/A-18, SH-60B, and the P-3C communities were chosen for this thesis as representative of a valid cross section of Naval Aviation. Each community's advanced qualifications were studied to determine the effectiveness and quality of training received in the simulator. Research data were obtained through: government publications, professional materials, previous theses, books, articles and personal interviews with cognizant personnel in Aviation Manpower & Training (N889F), Wing Training & Readiness Offices, CNAP/CNAL Readiness Officers, and Wing Simulator Officers. The flight hour cost savings from moving the identified qualifications to the simulator were compared to the additional simulator operating costs. The basic conclusion of this thesis is that there are significant financial savings from moving certain identified TRM qualifications to the simulator, with little or no degradation in training or safety. Therefore, moving these qualifications will reduce costs without significantly impacting operational readiness.

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I. INTRODUCTION

A. BACKGROUND

The Department of Defense (DoD) has seen its budget reduced for nine consecutive years and it will continue to compete for shrinking dollars in the future. It is imperative that the DoD use its scarce resource dollars efficiently. "Congress is looking for ways to squeeze dollars out of the operating budget, but it also wants to ensure it is not creating a 'hollow force' that cannot perform its mission." [Ref. 1: p. 7]

In Naval Aviation, the number of operational squadrons has decreased, but tasking for the aircrews which remain is "still considerable." One way to improve its efficiency is to ensure that Naval Aviation operational readiness qualifications are satisfied in an environment that yields the most effective training at a reasonable or affordable cost.

Operational squadrons maintain their readiness qualifications utilizing aircraft and simulators. Operational readiness is the assessed capability of a squadron to perform its primary mission as defined by the Chief of Naval Operations Instruction (OPNAVINST) C3501.2H: *Required Operational Capability/Projected Operational Environment (ROC/POE).* The ROC/POE instruction assigns Primary Naval Warfare Mission Areas (PMAs) to each type aircraft (e.g., F/A-18 PMA: Anti-Air Warfare (AAW), Amphibious Warfare (AMW), Anti-Surface Warfare (ASU), Mine Warfare (MIW), Strike Warfare (STW), Command, Control, and Communication (CCC), and Mobility (MOB)). The ROC/POE also describes the criteria the aircrew must meet to be fully capable of performing the PMA.

The Training & Readiness Matrix (TRM) lists the advanced qualifications that must be satisfied to obtain 100 percent readiness in the assigned PMA. Each qualification has a point value assigned to a particular

PMA. Full points are awarded if the qualification is conducted in flight. However, because the simulator is not a direct substitute for flying, a qualification that is conducted in the simulator typically receives partial PMA points (e.g., F/A-18 Training Event ACT 13 Radar Missile Defense: awards 2 AAW points if conducted in flight and 1 point for the simulator). Summing all the required qualifications, if performed in flight, would yield a point value of 100 in every PMA and the total annual flight hours required (e.g., SH-60B requires 365 flight hours per year to train an aircrewman at 100 percent readiness level).

The total annual flight hours required are one of three factors that go into the Primary Mission Readiness (PMR). The other two factors are the number of aircraft per squadron and the number of aircrew per aircraft. In today's peacetime environment, the DoN's funding is 85 percent PMR (83 percent toward flight hours and 2 percent toward simulator training). The TRM and PMR will be discussed further in Chapters II and IV.

The amount of training accomplished by each squadron is reflected in the training portion of its Status Of Resources and Training Summary messages [NWP 10-1-11] (SORTS). The SORTS message is a measure of overall operational readiness. The SORTS is divided into four areas: Personnel, Training, Equipment, and Maintenance. The highest rating, C-1, is recorded in the Training area if the squadron completed at least 85 percent of each PMA in the TRM. The SORTS is one of the few ways for the Joint Chiefs of Staff to monitor their squadrons' operational abilities.

Funding for the TRM is provided through the Flying Hour Program (FHP). Funding is based on an historical flight hour cost over the past three years (e.g., P-3C estimated cost for FY96 is 1714 dollars per flight hour based on averaging actual fuel and maintenance costs for FY 93/94/95). This funding only covers an average of 83 percent of the total funding required to complete Naval Aviation's TRM.

In July 1995, the TRM was updated to reflect added mission requirements that the aircraft must now support. With these additional

requirements has come additional flight time requirements to train the aircrews. However, the FHP is still being funded at the old historical levels. Since current funding is insufficient to maintain the current (old and expanded) level of in-air training, it is important to justify those qualifications that must be performed in the air, as opposed to in the simulator. The simulator is a viable and less costly trainer than the aircraft. A study conducted by the Center for Naval Analysis has noted that simulators are an underutilized asset in training the Fleet aviator.

> Our research suggests that simulators can contribute significantly to the training of Fleet aviators in the area of decision-making, an area where they play only a minor role at present. To be successful, particularly in combat, an aviator must make good decisions intuitively, and instantaneously. Research suggests that such decision-making calls on an aviators' (sic) collective experience with similar situations. Using simulators could be an economical and efficient way to give combat aviators a rich experiential background that could make the difference. [Ref. 2: p. 2]

This thesis will help determine which qualifications can be performed in the simulator and analyze the costs associated with those qualifications.

B. OBJECTIVE AND SCOPE

The basic objective of this thesis is to identify potential financial savings in operational flight training. The F/A-18, SH-60B, and the P-3C communities were chosen for this thesis as representative of a valid cross section of Naval Aviation. Each community's advanced qualifications were studied to determine the effectiveness and quality of training received in the simulator. Due to time and data restrictions and lack of professional expertise in some areas, only those advanced tactical crew qualifications were considered. The training events involving aircrew familiarity, aircrew navigation or aircrew mobility flights (i.e., safety-of-flight (SOF) qualifications) were not considered. The SOF qualifications that are

conducted in air were described as "critical" and "necessary" for effective aircrew training by numerous aviators interviewed for this thesis. The advanced qualifications considered for this thesis make up 42 percent of the total annual flight hours required by the three communities to complete the TRM. [Ref. 3]

This study addresses an issue that has a potentially significant budgetary impact for the Department of the Navy. If it is cheaper to perform certain qualifications in the simulator, with little or no degradation in training or safety, then the Department would be able to reapportion or reprogram spending without impacting operational readiness.

C. RESEARCH QUESTIONS

The following questions will be addressed:

1. Primary:

1. Are there any operational readiness qualifications currently being conducted in the air better suited for the simulator training environment?

2. Would the increased use of simulators in Naval Aviation during operational readiness qualifications reduce the costs to the Department?

2. Secondary:

1. What are the costs associated with performing the qualifications in the simulator? In the air?

2. Are there additional costs associated with moving the qualifications to the simulators?

3. Do the simulators now have the equipment necessary to perform the qualification?

4. Are there a sufficient number of simulators available to perform the qualification?

5. What are the costs associated with purchasing additional simulators (if needed)?

D. METHODOLOGY

Research data was obtained through government publications, professional materials, previous theses, books, and articles. Since little published research addresses the objective of this thesis directly, personal interviews were conducted with cognizant personnel in Aviation Manpower & Training (N889F) and Wing Training & Readiness Offices. Telephone interviews were also conducted with CNAP/CNAL Readiness Officers to reinforce the basis for conducting certain qualifications while airborne vice in the simulator and to better understand the intricacies of their respective TRM qualifications. Wing Simulator Officers were interviewed via telephone to determine the usage rate and costs associated with their training devices. In addition, the research made significant use of the CNAP/CNAL Squadron Training Matrices and the Center for Naval Analysis Simulator Memoranda.

Flight hour cost information was provided by (N889E) and tracked by its three main parts: Fuel, Aviation Depot Level Repairable Maintenance (AVDLR), and Aviation Fleet Maintenance (AFM).

E. CHAPTER ORGANIZATION

This thesis is divided into five chapters. Chapter I is the introductory chapter. It delineates the purpose of the thesis by providing background motivating the study. It also provides the framework by which the thesis will answer the stated research questions.

Chapter II presents an in depth description of the TRM and presents arguments detailing the pros and cons of simulator training versus flight training.

Chapter III discusses the simulator usage rates for each community.

Chapter IV compares the costs associated with performing TRM qualifications airborne versus in the simulator.

Chapter V summarizes the data and provides answers to the research questions stated in Chapter I. Conclusions and recommendations will focus on the potential cost savings of performing certain qualifications in the simulator vice in the air, while maintaining the quality of training. Also listed will be recommendations for further study related to a cost analysis of the TRM.

II. READINESS MEASUREMENT

A. PURPOSE OF CHAPTER

This chapter gives the reader an in depth understanding of the Training and Readiness Matrix (TRM). The chapter will explore the rationale of conducting TRM qualifications in flight as opposed to in the simulator. The analysis details the pros and cons of simulator use in the TRM. This chapter will also explain the points awarded for completing qualifications and the difference in point values between in-flight and simulator training. Events that could be moved to the simulator will be identified.

B. READINESS SYSTEM

Readiness can be defined as the capability of a squadron to perform an assigned mission. Training is the means by which units achieve readiness. Currently, Naval Aviation squadrons are required to report combat readiness status on a monthly basis to their respective fleet commanders. These fleet commanders, CNAP and CNAL, have jointly set forth comprehensive training, reporting, and readiness standards in an instruction that encompasses all segments of Naval Aviation. These segments, or "communities" are each responsible for maintaining proficiency in a number of PMAs.

U.S. Naval Aviation squadrons must operationally deploy at the highest level of readiness that can be achieved. A high level of readiness ensures the capability to effectively execute operational missions as directed by higher authority. This is achieved in part by completing a syllabus of flights or training events which carry with them specific training requirements [Ref. 3]. Hence, prior to any operational deployment, squadrons seek to maximize their combat readiness by completing syllabus training events as effectively as possible given the restrictions of time, money, and training asset availability. [Ref. 4]

"Squadrons' funding requests are made mainly through the submission of flight hours required to maintain full mission readiness. To determine the requisite hours necessary, squadrons are primarily guided by three major documents: (1) SORTS, (2) ROC/POE, and (3) TRM." [Ref. 5] Utilizing the information from these three sources, squadrons are able to compute the number of flight hours which will ensure 100 percent combat readiness in all assigned PMAs.

1. SORTS

The SORTS message, as mentioned in Chapter I, is used to report levels of readiness up the chain of command. SORTS focuses on the status of a squadron's resources and training and measures this status against the resources and training needed for the squadron to undertake its full wartime mission, C-1. The requirements a squadron must possess in each PMA to achieve a C-1 rating in Training, are detailed in the ROC/POE. A squadron must meet, at a minimum, 85 percent of all the PMAs to achieve a C-1 rating. The next level is a minimum 70 percent of PMAs to achieve a C-2 rating, and so on down to C-5.

2. ROC/POE

The ROC/POEs for each squadron type have different PMAs depending on the squadron's war fighting role. As discussed in Chapter I, the F/A-18 squadron's PMAs are: AAW, ASU, STW, AMW, MIW, MOB, and CCC. The SH-60B squadron's PMAs are: ASU, Anti-Submarine Warfare (ASW), Command and Control Warfare (C2W), CCC, and MOB. The P-3C squadron's PMAs are: ASU, ASW, CCC, C2W, Intelligence (INT), MIW, and MOB. Training requirements in these PMAs are formalized by incorporating related training qualifications in the TRM. Each individual qualification is further broken down to specify the initial qualification and currency requirements. Once a qualification has been completed by an aircrew, the aircrew is considered current in that qualification and is awarded points in the relevant PMA. After a set period of time, currency in a qualification lapses, and the

aircrew must again complete the training event. Typically, a qualification is valid for a period ranging from 30 days to 36 months. Failure to requalify would forfeit the PMA readiness points for that qualification. [Ref. 4] These training qualifications are also broken down into the flight hours, ordnance, training facilities, and support equipment necessary to accomplish the qualification. Appendices A, B, and C list the TRMs for the F/A-18, SH-60B, and P-3C squadrons, respectively.

3. TRM

Each squadron's TRM conveys the same general information about the requirements necessary to achieve the qualification, but each has a different methodology for requesting flight hour allocations.

a. F/A-18

The F/A-18 community has 22 operational squadrons. Ten squadrons are home ported on the east coast, stationed at NAS Cecil Field, FL. Twelve squadrons are home ported on the rim of the Pacific Ocean. Ten of the 12 are stationed at NAS Lemoore, CA and 2 are stationed at NAS Atsugi, Japan. The TRM is based on 17 aircrews and 12 aircraft per squadron. The F/A-18 is a single-seat aircraft.

The F/A-18 community requests 385.6 flight hours per individual aircrew per year to complete all of the 101 TRM qualifications, or roughly 32 hours/crew/month. There are 15 SOF training events and 86 advanced tactical crew qualifications.

Of the 101 qualifications, 62 are funded as single airborne events. The other 39 events for which no flight hour funding is requested are: 34 "conjunctive" in-flight training events (i.e., to be conducted with another airborne event), 3 flights are allowed to be substituted with a simulator period if unable to fly. There are 5 simulator only events, with 1 being a SOF event.

There are 32 events to be conducted primarily in flight and secondarily in the simulator. If the event cannot be conducted in flight then the simulator may be utilized to complete the qualification. However, the readiness points awarded in the simulator are penalized from 0 to 80 percent

of the total flight readiness points in the PMA. These 32 events contain 4 pilot safety-of-flight (SOF) qualifications and 28 advanced tactical crew qualifications (i.e., weapon deliveries).

b. SH-60B

The SH-60B community has 10 squadrons. Four squadrons are home ported on the west coast, stationed at NAS North Island, CA and 6 squadrons are home ported on the east coast, stationed at NAS Mayport, FL. The TRM is based on 14 aircraft and 20 aircrew per squadron. The SH-60B has 2 pilots and 1 sensor operator.

The SH-60B community requests 365 flight hours per individual aircrew per year to complete all of the 47 TRM qualifications, or 30 hours/crew/month. There are 23 SOF events and 24 advanced tactical crew qualifications.

Forty-five of the 47 qualifications are funded as single airborne events. The other 2 events are conjunctive in-flight qualifications that have no flight hours allocated to the event. Two of the 45 in-flight qualifications require a practice period in the simulator, prior to the event being flown.

Out of the 47 TRM flights required to complete the matrix, 14 events can be conducted in the simulator, if the event cannot be accomplished airborne. However, a simulator event is awarded only 70 percent readiness points in the PMA, as opposed to 100 percent readiness points if conducted in the air. These 14 events contain 5 SOF qualifications and 9 advanced tactical crew qualifications.

c. P-3C

The P-3C community has 13 operational squadrons. Seven squadrons are home ported on the east coast, 4 stationed at NAS Brunswick, ME and 3 stationed at NAS Jacksonville, FL. There are 6 squadrons home ported along the Pacific ocean, 3 stationed at NAS Whidbey, WA and 3 stationed at NAS Barbers Pt, HI. The TRM is based on 9 aircraft and 12 aircrew per squadron. Each crew is made up of: 3 pilots, 2 Flight Engineers, 1

Tactical Coordinator, 1 Navigator/Communicator, 1 In-Flight Technician, 1 Ordnanceman, and 3 sensor operators.

The P-3C community requests 696 flight hours per individual aircrew per year to complete all 52 TRM qualifications, or 58 hours/crew/month. There are 11 SOF events and 41 advanced tactical crew qualifications.

Of the 52 TRM events, 28 are funded for airborne training (6 flights also require simulator periods). The other 24 training events that are not allocated flight hours are: 7 events that are required to be conducted in the simulator, and 17 to be flown in conjunction with one of the events that is flight hour funded (4 flights also require simulation periods). The 7 events required to be conducted in the simulator are all advanced tactical crew qualifications and receive 100 percent readiness points in the PMA. There are 8 funded flights requiring that 41 simulator periods be conducted prior to the event being flown.

TRM flight funding that was discussed in the preceding paragraphs is further broken down into percentages of TRM events and is listed in the following table.

F/A-18	EVENTS	PERCENT
FUNDED FLIGHTS	*62*	*61%*
FLT ONLY	33	33%
FLT/SIM	29	29%
NON FUNDED	*39*	*39%*
CONJUNCTIVE FLTS	31	31%
SIMULATORS	5	5%
FLT/SIM	3	3%
TOTAL	101	100%

SH-60B	EVENTS	PERCENT
FUNDED FLIGHTS	*45*	*96%*
FLT ONLY	31	66%
FLT/SIM	14	30%
NON FUNDED	*2*	*4%*
CONJUNCTIVE FLTS	2	4%
SIMULATORS	0	0%
FLT/SIM	0	0%
TOTAL	47	100%

P-3C	EVENTS	PERCENT
FUNDED FLIGHTS	*28*	*54%*
FLT ONLY	22	42%
FLT & SIM	6	12%
NON FUNDED	*24*	*46%*
CONJUNCTIVE FLTS	13	25%
SIMULATORS	7	13%
FLT & SIM	4	8%
TOTAL	52	100%

FLT ONLY - Event conducted airborne only
FLT/SIM - If unable to conduct event airborne then allowed to substitute with simulator
CONJUNCTIVE FLTS -Event to be completed with a funded airborne event
SIMULATORS -Event conducted in simulator only

Table 2.1 Funded vs. Non-Funded TRM Events

Comparing the results in Table 2.1 shows that the SH-60B community requests flight hour funding for 96 percent of its TRM events, and the F/A-18 and P-3C communities request 61 and 54 percent respectively. The main difference is that the SH-60B community does not list any conjunctive flights or dedicated simulator evolutions in its TRM.

C. SIMULATOR USAGE ARGUMENTS

Simulators enjoy several advantages over flight training, but they also suffer from several disadvantages. A careful look at these advantages and

disadvantages will help in analyzing the use of both simulators and aircraft in readiness training. The following material draws heavily from the framework and material in CNA Research Memorandum 95-143 [Ref. 1]. First, a look at the advantages of simulator training compared with flight training is presented.

1. Advantages

a. Simulators do not put the aircraft and aircrew at risk. Consequently, evolutions that are too dangerous to practice in flight can be practiced in a simulator (i.e., engine failures, control surface failures).

b. Simulator time is more efficient than flight time. More training can be conducted in less time in a simulator, because certain evolutions, that are not central to training, are included in flight training time (e.g., launch, recovery, reposition and fuel if necessary) but are not required in the simulator.

c. Some simulator scenarios can be more realistic than actual flight scenarios. Simulators can emulate platforms that U.S. forces do not have in inventory (e.g., *Oscar*- class submarine, MiG-29 *Fulcrum* aircraft) or emulate U.S. platforms that rarely train together (e.g., Joint Operations, multiple Battle Groups). Also, simulators can imitate the characteristics of expendables that are rarely available for training (i.e., Air to Ground and Air to Air missiles). A simulator can be manipulated to delete "killed" objects from the scenario, exercising the aircrew's battle-damage assessment skills. This type of manipulation is not fully possible during flight training. Simulators do not have to contend with the safety problems of having nonexercise players wandering into the training area. The environment can also be controlled to render the appearance of training in foul weather, changing hydrostatics for Anti-Submarine Warfare (ASW) training, or increasing the training area that would not otherwise be available on a training range.

d. There are many other considerations that place limits on the use of an aircraft's full operational ability (i.e., noise abatement restrictions, sonic booms). These restrictions do not apply in the simulation environment. When conducting airborne training the aircrew must be fully cognizant of danger to bystanders and commercial traffic, and to adverse effects on the environment. For security reasons, the full use of tactics may be curbed in the air, however, they can be used unconstrained in the simulator.

e. The simulator can be a better tool for assessing the performance of an aircrew's performance during a particular training evolution. The aircrew receives immediate feedback on their performance obtained from an accurate reconstruction. The instructor may "pause" the scenario to emphasize certain critical training aspects. The scenarios are reproducible, so they can aid an instructor comparing the abilities of aircrews. [From Ref. 1: p. 24-25 and Ref. 2: p. 24-25]

The above advantages of simulator training compared with flight training are summarized in the following table.

- GREATER SAFETY
  - No Risk to Aircraft or Aircrew
- MORE EFFICIENT
  - More Training in Less Time
- GREATER SCENARIO FLEXIBILITY
  - Adversary Force Complement
  - Own Force Complement
  - Available Expendables
  - Battle Damage Assessment
  - No Interference from Nonexercise Players
  - Environmental Control
- FEWER POLITICAL/SECURITY CONSTRAINTS
  - Diplomatic Concerns
  - Safety of Third Parties
  - Interference with Commerce
  - Environmental Impact
  - Security Concerns
- BETTER AIRCREW PERFORMANCE CRITIQUE
  - Immediate Training Feedback
  - Greater Instructor Flexibility
  - Reproducible Scenarios

Table 2.2 Advantages of Simulator Training Compared with Flight Training [From Ref. 1: p. 24]

Next, a look at the disadvantages of flight training compared with simulator training will be presented.

2. Disadvantages

a. The simulator has a relatively benign psychological setting. It is somewhat removed from reality because the aircrew knows there are no real-world consequences from mishandling the aircraft. Because the aircrew knows the situation is make-believe, taking it seriously is difficult, even if they are inclined to do so. Flight training also suffers from this problem, but a much lesser degree (e.g., unlike actual combat no one is trying to kill the aircrew).

b. Simulation is based on models, and our modeling ability is less than perfect. Thus, aircrews could learn inappropriate lessons from faulty models. Our ability is limited because we are unable to effectively

model current technological constraints (e.g., high "g" forces, presentation of accurate visual cues). The scale of simulator training is currently limited. Most aircraft simulators are designed as stand alone trainers; only a few can be linked for section training (e.g., F/A-18 Weapons Tactics Trainer (WTT) can only link with one other WTT, the P-3C Weapons Systems Trainer (WST) and the SH-60B Operational Flight Trainer (OFT) simulators are stand alone). Two other modeling limitations affect simulation. First, we do not understand some phenomena well enough to accurately model them (e.g., shallow water acoustics, the decision-making process of human adversaries). Secondly, we think we are modeling some phenomena accurately, but we cannot be sure without comparing the model to real-world data (e.g., MK-46 torpedo capability against an *Oscar-* class submarine).

c. Modeling is a simplified representation of reality, some aspects of the represented phenomenon are omitted. These omissions can be a problem if the simplification affects the training.

The above disadvantages of simulator training compared with flight training are summarized in the following table. [From Ref. 1: p. 22-23]

• PSYCHOLOGICAL SETTING
- Suspension of Fear Factor
• MODELS NOT REALITY
- Technical Constraints in Modeling
- Limited Understanding of Phenomena
- Model not Real-World Tested
- Limited Scale
• SIMPLIFICATION OF REALITY
- Reality Omissions Exist in Model

Table 2.3 Disadvantages of Simulator Training Compared with Flight Training [From Ref. 1: p. 23]

3. Advantages vs. Disadvantages

Weighing these simulator advantages and disadvantages against flight training and then applying this rationale to the TRM, yielded a "must fly" criteria. These "criteria" were verified by extensive interviews with experts,

as listed in Chapter I. If the qualification required at least one of three specific criteria, then that qualification should be performed in the air. These criteria include: qualifications that require a significant amount of maneuvering (e.g., high "g" forces); qualifications that require significant visual cues (e.g., watching ordnance impact the target); qualifications that require command and control of other aircraft or concentrated communications with other units. The simulator was deemed not a valid training substitute to perform these type qualifications. The simulators cannot create an effective scenario that could replace actual flying. The three "criteria" that dictate a qualification be performed in-flight are listed as follows and were verified through [Ref. 6] - [Ref. 11]:

a. Significant Aircraft Maneuvering - Those simulators that do have motion (e.g., WTTs, P-3C and SH-60B OFTs), do not portray the effects of heavy aircraft maneuvering on the human body (i.e., high "g" forces). The simulators do not effectively replicate the "fear of dying" that would normally be present while performing the qualification in the air to the aircrew. The need for this fear of crashing the aircraft outweighs the benefits of training in the simulator.

b. Significant Visual Cues - The WTTs and OFTs present graphical visual displays to the aircrew, within various degrees from state of the art in the WTTs to simple graphics in the SH-60B and P-3C OFTs. However, the WSTs do not present a visual display to the aircrew and the WTTs and OFTs cannot accurately display the true visual effects obtained while flying the qualification.

c. Command and Control or Concentrated Communications - The simulators cannot effectively duplicate the difficulties associated with the communication environment.

Table 2.4 summarizes the criteria, which mandate the qualification be performed in the air.

• SIGNIFICANT MANEUVERING • SIGNIFICANT VISUAL CUES • COMMAND, CONTROL, & COMMUNICATION

Table 2.4 Flight Qualification Mandatory Criteria [Ref. 6] - [Ref. 11]

D. REVISED TRM ANNUAL EVENT HOURS

Applying Table 2.4 criteria to the scope of this thesis, advanced tactical crew qualifications (i.e., non SOF qualifications), identifies the following table of qualifications that appear appropriate to be conducted in the simulator environment. No flight funding would be allocated for these events if conducted in the simulator.

	TRM EVENT		EVENT HRS	ANNUAL FLT HRS
F/A-18	WAG 9 -	Radar Delivery	1.6	3.68
	WAG 10 -	Radar Offset Delivery	1.6	3.68
	WAG 16 -	HARM Captive Carry	4.0	9.20
	WAG 17 -	HARPOON Captive Carry	1.0	2.30
	WAG 19 -	Laser MAVERICK Captive Carry	2.0	4.60
	ACT 8 -	Combat Air Patrol	2.0	4.60
	ACT 9 -	Sweep	2.0	4.60
F/A-18 Total			**14.2**	**32.66**
SH-60B	ASW 7 -	Radar Exercise	3.5	3.5
	ASW 8 -	MAD/Active Exercise	3.5	3.5
SH-60B Total			**7.0**	**7.0**

WAG - Weapons Air to Ground
ACT - Air Combat Training
ASW - Anti-Submarine Warfare
EVENT HRS - Annual hours to complete event only
ANNUAL FLT HRS - Includes transit time and NAMP average

Table 2.5 Recommended Flight Qualifications to be Accomplished in the Simulator [Ref. 6] - [Ref. 11]

A further explanation of a WAG type event would be an aircrew performing the flight profiles necessary to deliver air to ground ordnance. An ACT event involves an aircrew displaying air to air combat maneuvers.

An ASW event involves the aircrew performing different anti-submarine tactics.

The 9 TRM events from Table 2.5 are all fully funded flight events. The 9 events further break down into the categories listed in Table 2.1; the 5 WAG events are part of the 29 flight/simulator events, the 2 ACT events are part of the 33 flight only events, and the 2 ASW events are part of the 14 flight/simulator events.

There are no P-3C events identified to be moved to the simulator environment. Those events that could be conducted in the simulator due to not meeting the "must fly" criteria listed in Table 2.4, are not allocated any flight hours in the TRM and are considered conjunctive flights. No flight funding would be saved by moving conjunctive flights to the simulator environment.

E. SUMMARY

There exist training events in the F/A-18 and SH-60B community TRMs that are now done in flight, that can be conducted in the simulator. Weighing the advantages and disadvantages of satisfying certain qualifications in simulators yields seven F/A-18 and two SH-60B training events that could be conducted in the simulator. The P-3C TRM requests flight time to conduct flight qualifications that need to be done in the air. If a qualification does not meet the "must fly" criteria, then the associated training event has to be done in conjunction with a flight only training event or performed in the simulator.

III. SIMULATORS

A. PURPOSE OF CHAPTER

This chapter explains how each aviation community utilizes its simulators. The chapter will identify the types of simulators each community uses. It will also identify the amount and type of training being conducted in the simulators.

B. SIMULATOR UTILIZATION

Different communities use simulators differently. The following table displays the maximum number of simulator events necessary to satisfy the Training and Readiness Matrix (TRM) if all flight/simulator qualifications were completed in the simulator vice airborne.

COMMUNITY	TRM EVENTS	MAX SIM EVENTS	% TRM
F/A-18	101	37	37
SH-60B	47	14	30
P-3C	52	17	33

Table 3.1 Simulator Percentage of TRM [From Ref. 3]

Because many TRM events require periodicity of the qualification be maintained (i.e., every month, every three months...), a training period would need to be conducted more than once to maintain currency in the qualification. Annually, the maximum number of simulator periods necessary to complete and maintain currency of the TRM would be: F/A-18 (146), SH-60B (67), and P-3C (63).

Every operational community has to compete for simulator time with the Fleet Replacement Squadrons (FRSs) and other non-operational units (e.g., Reserves, Foreign Nationals). From FY 1990-1995, the FRSs required a significant amount of simulator time compared with the operational

squadrons as is displayed in Appendix E. The simulator utilization for each community is expressed as a percentage of total simulator hours used for that platform: F/A-18 (70 percent FRS and 20 percent Operational), SH-60B (60 percent FRS and 32 percent Operational), and P-3C (34 percent FRS and 56 percent Operational). Appendix E also shows the simulator use as a percentage of hours the simulator is available. From FY 1990-1995, the average simulator utilization by community was: F/A-18 (74 percent), SH-60B (94 percent), and P-3C (81 percent). There are various reasons for not achieving 100 percent utilization (e.g., unscheduled maintenance, cancellations, aircrew no-shows).

The FRSs have priority in using the simulators over the operational squadrons. In addition, the simulators must be available for a maintenance period of at least eight continuous hours per day. Simulator maintenance is performed by technicians from the company owning the contract, called Contracting Officer's Technical Representatives (COTRs). The time periods that the simulator is available for use are stipulated by contract; availability differs from community to community.

The following three sections describe how each community uses its available simulator time to complete its TRM.

1. F/A-18 Simulator Usage

The F/A-18 community has both Operational Flight Trainers (OFTs) designed for safety-of-flight (SOF) training, and Weapons Tactics Trainers (WTTs), designed for advanced aircrew tactical training. "The WTT is a state-of-the-art simulator that the pilots like to use." [Ref. 6] The WTTs contain two full motion, 240-degree full color graphic view, complete aircraft cockpit mock-ups called "domes". The domes within each WTT can be linked together for section training. Currently, one "dome" is being upgraded to accommodate training for the next generation F/A-18 E/F. Most of the aircrew's tactical training involves deploying specific strike weapons used in WAG events (e.g., HARM, HARPOON, MAVERICK).

Simulator training is conducted in two locations: NAS Lemoore, CA and NAS Cecil Field, FL. There are two WTTs located at each site. There is also an FRS stationed at both locations. Simulator operating hours extend from 0800 to 1600. Simulators operated after 1600 are charged an overtime or "premium" rate. Since FRSs have priority, any overtime costs are usually born by the operational squadrons.

Drawing from a CNA study regarding an individual operational squadron's simulator utilization [Ref. 14], the following table delineates the training categories that are used in simulators.

F/A-18	OFT HRS	WTT HRS	TOTAL	PERCENT
SOF				
TRM events	35	1	36	19%
Non-TRM	33	5	38	20%
	68	6	74	40%
TACTICAL				
TRM events		21	21	11%
Non-TRM	1	29	30	16%
	1	50	51	27%
OTHER	12	50	62	33%
TOTAL	81	106	187	100%

Table 3.2 Scheduled VFA-82 Simulator Hours (March 1994 - March 1995) [From Ref. 14: p. 12]

The CNA study stated that if there were no PMA readiness points for an event then that event was considered non-TRM. The following represent examples of the types of events per category: SOF TRM events (Instrument checks and Naval Air Training Operating Procedures (NATOPS) flights); SOF non-TRM events (Emergency Procedures (EPs), Night Carrier Landing Training (NCLT), Instrument Approaches, Functional Check Flights (FCFs) (no PMA readiness point value); Tactical TRM events (A/A Banner, Radar Delivery, Captive Carry of WAG ordnance, Radar Missile Defense); Tactical

non-TRM events (Demo Practice, Night Vision Goggles (NVG), Section tactics, 2 v X intercepts, Missile Profiles).

Using the data in Table 3.2, another useful category of information can be calculated: the percentage of TRM events in the total scheduled simulator hours. For the F/A-18, this is 30 percent (36 + 21 = 57 ÷ 187). Therefore, 70 percent of the simulator time is scheduled for non-TRM events. Table 3.2 lists "optimistic" utilization rates because it shows only scheduled information. Actual completed qualifications would be lower because of cancellations and unscheduled maintenance.

Narrowing the data from Table 3.2 to advanced tactical crew qualifications (non-SOF events) yields Table 3.3.

F/A-18	WTT HOURS	PERCENT
TACTICAL		
TRM events	21	21%
Non-TRM	79	79%
Total	100	100%

Table 3.3 Scheduled Tactical TRM Utilization of F/A-18 Simulator

Table 3.3 shows that the advanced tactical crew qualifications being scheduled for the WTTs utilize only 21 percent of the total non-SOF scheduled WTT simulator time. This is even less than the 30 percent overall scheduled TRM simulator utilization rate in Table 3.2. Hence, after excluding those TRM training events that require aircrew SOF training, squadrons are utilizing WTTs for non-TRM training events 79 percent of the time.

The preceding tables do not show the recent requirement for operational squadrons to ensure that their newly arrived pilots undergo additional training in *Strike Fighter Weapons and Tactics.* The additional 13 WTT periods and 35 flights that used to be in the FRS training "pipeline" now must be conducted by the operational squadrons. Many of these additional events (e.g., WAG, ACT, and WAA (Weapons Air to Air)) apply

directly to the TRM. However, they have yet to be incorporated and funded. [Ref. 6]

2. SH-60B Simulator Usage

SH-60B simulator training is conducted in two locations: NAS North Island, CA and NAS Mayport, FL. The SH-60B community has two full-motion OFTs for pilot and co-pilot SOF training at each training site. They can be linked together with one of three static simulators (i.e., sensor operator station mock-up) called a Weapons Tactics Trainer (WTT). When the two simulators are linked, the system becomes a full-crew tactical training system, called a Weapons Systems Trainer (WST). (Note that the SH-60B WTT is different than the F/A-18 WTT (i.e., F/A-18 WTT is full motion simulator with a 240 degree color display)). The OFTs provide a basic non-color graphic visual display of the training scenario. Most aircrew tactical training involves procedures used for ASU and ASW. One FRS is stationed at both training locations. Since FRSs have priority scheduling, any overtime costs are usually born by the operational squadrons. Operating hours for the OFT simulators are 0800 to 2400 and 0800 to 2000 for the WTTs. Simulators used after operating hours are charged an overtime rate.

Drawing again from [Ref. 14], the following table delineates the training categories in which the SH-60B simulators are utilized.

SH-60B	OFT HRS	WTT HRS	WST HRS	TOTAL	PERCENT
SOF					
TRM events	1			1	0%
Non-TRM	422	4	71	497	49%
	423	4	71	498	49%
TACTICAL					
TRM events	8	113	120	241	24%
Non-TRM	5	58	86	149	15%
	13	171	206	390	39%
OTHER	42	39	37	118	12%
TOTAL	478	214	314	1006	100%

Table 3.4 HSL-49 Scheduled (March 1994 - March 1995) and HSL-46 Recorded (July 1994 - March 1995) Simulator Hours [From Ref. 14: p. 13-14]

The CNA study placed events that had no PMA point value in the non-TRM category. The following represent examples of the types of events per category: SOF TRM events (Instrument Approaches); SOF non-TRM events (Instrument checks (no PMA point value), Emergency Procedures (EPs)); Tactical TRM events (Strike Control, Shallow Water/Diesel Graded Exercise, Air Coordinated Exercise, Radar Exercise, IFF Tracking Exercise); Tactical non-TRM events (Tactics Review, Tactical Evaluation, ASW Freeplay, Sea-Based Weapons and Advanced Tactics School).

Using the data in Table 3.4, the percentage of TRM events to the total scheduled simulator hours can be calculated for the SH-60B community. This equates to 24 percent (1 + 241 = 242 ÷ 1006). 76 percent of simulator time is used for non-TRM events. Table 3.4 lists, optimistic utilization rates, because data gathered from one of the two squadrons was scheduled information, while the data from the other squadron was recorded information.

Tactical advanced crew qualifications require the OFT and WTT to be linked, forming the WST system. Narrowing the data from Table 3.4 to advanced tactical crew qualifications (non-SOF events) yields, Table 3.5.

SH-60B	WST HRS	PERCENT
TACTICAL		
TRM events	120	58%
Non-TRM	86	42%
TOTAL	206	100%

Table 3.5 Scheduled and Recorded Tactical TRM Utilization of SH-60B Simulators

Table 3.5 indicates that advanced tactical crew qualifications being scheduled for the WST (e.g., OFT and WTT coupled) utilize 58 percent of the total scheduled tactical training time. This is greater than the TRM's 24 percent overall scheduled time for advanced tactical crew qualifications. When excluding those TRM training events that require pilot SOF training and concentrating on tactical advanced crew qualifications, squadrons are utilizing OFTs and WTTs for non-TRM events training 42 percent of the time.

3. P-3C Simulator Usage

The P-3C community uses a full-motion OFT for SOF training for pilots and flight engineers. The community also uses the static WST simulator for advanced tactical crew training. The WST is a complete mock-up of the tactical crew stations. (The P-3C WST should not be confused with the SH-60B WST (i.e., SH-60B WST is a tactical link between the OFT and static WTT)). The OFT and WST simulators can be linked together. However, it is not required for many advanced tactical crew qualifications. The OFT provides a basic visual representation of the training scenario. The aircrew's tactical training in the WST primarily involves ASW procedures.

Simulator training is conducted in four locations: NAS Barbers Pt, HI; NAS Whidbey Island, WA; NAS Jacksonville, FL; and NAS Brunswick, ME. All four locations have one OFT and one WST. Only those operational squadrons stationed at NAS Jacksonville compete with the FRS for simulator use. Operating hours for the simulators on the west coast are 0700 to 1900,

and 0800 to 2400 on the east coast. Simulators used after operating hours are charged an overtime rate.

No available study breaks down how the P-3C simulators are used (e.g., SOF, Tactical, and Other TRM and non-TRM events). However, tactical training information was obtained via phone conversations with Wing Training and Readiness Offices. [Refs. 10, 15 and 16] The following table delineates how the WST is used.

P3-C	WST HRS	PERCENT
TACTICAL		
TRM events	3890	53%
Non-TRM	3429	47%
Total	7319	100%

Table 3.6 Actual P-3C usage Rate FY95

Table 3.6 shows the WSTs are utilized 53 percent of the time toward TRM advanced tactical crew qualifications and 47 percent toward non-TRM training events. Examples of Tactical TRM events are: ASUW Joint Coordinated Exercise, Shallow Water Diesel Graded Exercise, ASW Coordinated Exercise, Operational Readiness Evaluation. Examples of Tactical non-TRM events (events not listed on the TRM) are: ASW and ASUW Freeplay, Tactics Review, Tactical Evaluations.

C. SUMMARY

Aviation communities are not utilizing simulators toward TRM events as much as available. Even though the FRSs use a significant amount of the available simulator time, the operational squadrons have the opportunity to expand their simulator time toward TRM "readiness" events. The advanced tactical TRM usage rates for each community are: F/A-18 (21 percent); SH-60B (58 percent); and the P-3C (53 percent).

There are cost advantages to shifting appropriate TRM events from in-flight training to simulator training. The cost savings associated with using simulators for more TRM qualifications will be identified in the next chapter.

IV. COST ANALYSIS

A. PURPOSE OF CHAPTER

This chapter develops flight hour and simulator costs for the three identified communities. These costs will be used to estimate potential cost savings from completing the TRM events, identified in Chapter II, in the simulator training environment.

B. FLIGHT HOUR COSTS

Funding for flight hours to complete the TRM is based on a factor called Primary Mission Readiness (PMR). If communities received 100 percent of the flight hours required to complete the TRM, they would satisfy 100 percent PMR. The CNO has reduced the number of flight hours required to be funded by reducing the percent of PMR a squadron receives. The decline in flight hour funding started in the mid 1970's (88 percent PMR) and continued through the 1980's (87 percent PMR) to today's current Naval Aviation average PMR of 85 percent PMR (i.e., each community may be above or below that average). The currently funded flight hours are further reduced by an additional 2 percent PMR. This 2 percent reduction is to be recouped by moving TRM qualifications to the simulators, thereby achieving 85 percent PMR (minimum requirement for a C-1 rating in Training Readiness).

The current PMR based flight hour funding uses an older version of the TRM (prior to July 1995). [Ref. 13] The older version does not accurately reflect the flight-time (Hours/Crew/Month) (H/C/M) necessary to complete the new missions required in the current TRM. [Ref. 3] The change in flight-time requirements are: F/A-18 (from 25 to 32 H/C/M), SH-60B (no change), and P-3C (from 50 to 58 H/C/M). [Ref. 13]

1. Flight Hour Budgeting

Flight-time funding to complete the TRM is based on budgeted flight hours multiplied by the cost per flight hour. The equations to calculate the annual budgeted costs for TRM flights are as follows:

1. (Number of Aircraft) X (Crew Seat Ratio) = Allowed Crews
2. (Allowed Crews) X (Aircrew Manning Factor) = Budgeted Crews
3. (Budgeted Crews) X (Hours/Crew/Month) X 12 Mos = Annual Flying Hours Required
4. (Annual Flying Hours Required) X (Percent of PMR) = Annual Budgeted Flying Hours
5. (Annual Budgeted Flying Hours) X (Cost Per Flight Hour) = Annual Budgeted Flight Cost [Ref. 17]

The variables above will be described further here. **Number of aircraft** is the actual number of aircraft authorized per squadron for full combat readiness, as issued by the program sponsor at N889; **Crew Seat Ratio** (CSR) is the number of aircrews programmed per aircraft and is provided by the Bureau of Personnel; **Aircrew Manning Factor** (AMF) is based on manning levels and is currently determined by the CNO to be 1.0; **Hours/Crew/Month** is determined from the flight time requirements necessary to complete the TRM; **Primary Mission Readiness** (PMR) is the flight hours necessary to complete the TRM, keeping the aircrew current in all PMAs (i.e., 100 percent PMR = 100 percent currency in PMAs); **Cost Per Flight Hour** (CPH) is the variable cost to operate the aircraft and will be discussed in further detail later in this chapter.

FY95 flight-hour costs are broken down by the above mentioned variables and are displayed in the following table by community:

COMMUNITY	# A/C	CSR	AMF	H/C/M	MOS	% PMR	CPH	TOTAL COST ($M)
F/A-18	250	1.42	1	25	12	90%	$2,976	$285
SH-60B	112	2.27	1	30	12	81%	$1,156	$ 86
P-3C	124	1.38	1	50	12	82%	$1,994	$168

Table 4.1 FY95 Flight Hour Costs [Ref. 18]

The FY96 and FY97 annual projected costs may also be broken down by community, as shown below:

COMMUNITY	# A/C	CSR	AMF	H/C/M	MOS	% PMR	CPH	TOTAL COST ($M)
F/A-18	260	1.42	1	25	12	86 %	$3,063	$291
SH-60B	115	2.27	1	30	12	84 %	$1,082	$ 85
P-3C	114	1.38	1	50	12	81 %	$1,714	$131

Table 4.2 FY96 Budgeted Flight-Hour Costs [Ref. 18]

COMMUNITY	# A/C	CSR	AMF	H/C/M	MOS	% PMR	CPH	TOTAL COST ($M)
F/A-18	276	1.42	1	25	12	85 %	$2,977	$298
SH-60B	118	2.27	1	30	12	83 %	$1,149	$ 92
P-3C	110	1.38	1	50	12	81 %	$1,794	$132

Table 4.3 FY97 Budgeted Flight-Hour Costs [Ref. 18]

Tables 4.2 and 4.3 are based on H/C/M from the older version TRM (not reflecting up to date PMAs). If the percent PMRs are not changed and the H/C/M were to be based on the updated TRM mission areas, then the budgeted flight-hour costs would be: F/A-18 (32 H/C/M), FY96 = $373 M or an additional $82 M, FY97 = $381 M or an additional $83 M; SH-60B, no change in H/C/M for FY96 or FY97; P-3C (58 H/C/M), FY96 = $152 M or an additional $21M, FY97 = $154 M or an additional $22 M. A considerable amount of additional money is required to fund the current TRM flight events.

However, if the funding levels are not increased, then the percent of PMR must be lowered to reflect the budgeted flight-hour costs for the more current TRM. The new PMR percentages would be: F/A-18, FY96 = 67 percent PMR or C-3 in Training Readiness, FY97 = 67 percent PMR; no change

in SH-60B H/C/M for FY96 or FY97; P-3C, FY96 = 70 percent PMR or the minimum C-2 rating in Training Readiness, FY97 = 70 percent PMR.

While this funding level encourages squadrons to monitor spending and conserve resources, it may come at the expense of readiness and training (i.e., flying less aggressive weapon delivery profiles in order to save on fuel). This funding level also severely hampers a squadron's ability to choose between flights that may benefit the squadron's reportable readiness level or non-reportable additional quality training (i.e., freeplays, follow-on event training). "The incentive for operational units to conserve assets is real in the fact they must make up for underfunding in relation to preparing to meet assigned missions. There is a definite negative incentive, however, for them to attain any real savings over and above what they can reprogram to cover FHP deficits." [Ref. 5: p. 26-27]

2. Cost Per Flight Hour

The Cost per Flight Hour (CPH) is calculated by dividing the sum of variable flight-time costs (e.g., fuel, maintenance, and repair) by the actual hours a squadron flew (see Table 4.4). Fuel costs include aviation fuel, engine oil, and lubricants. Maintenance costs are divided into two categories: (1) Organizational Maintenance Activity (OMA) - squadron level costs to maintain the aircraft and (2) Intermediate Maintenance Activity (IMA) - the costs associated with intermediate level repair and maintenance. OMA costs are entirely for consumables, or items that are more economical to replace then repair. IMA costs include both consumables and items repaired at the intermediate maintenance level. Repair costs include Aviation Depot Level Repairable (AVDLR) items, the costs of major component rework, repair, and replacement which is beyond an IMA's capability. [Ref. 5: p. 36]

Table 4.4 depicts, by community, a breakdown of flight costs spent during FY95.

COMMUNITY	FUEL ($M)	MAINT ($M)	AVDLR ($M)	TOT COSTS ($M)	FLT HRS	CPH
F/A-18	$ 75	$ 59	$ 151	$285	95,850	$2,976
SH-60B	$ 7	$ 23	$ 56	$ 86	74,314	$1,156
P-3C	$ 46	$ 80	$ 42	$168	84,328	$1,994

Table 4.4 Annual Flight Costs FY95 [Ref. 18]

The CPH calculated in this thesis is considered "conservative." It only includes the direct variable costs of a flight hour. Many other costs that are typically included in fully allocated flight hour costs are considered fixed costs in this thesis (i.e., Aircrew Initial Training Costs, Aircraft Depreciation, Maintenance Personnel Costs, Base Support Costs, AVDLR contracted out to major aircraft rework facilities, etc.). Fixed costs are generally independent of flight hours, so they are excluded from this analysis. Variable costs are conservative in this thesis because some of these "fixed costs" have a variable cost component.

When budgeting for CPH, N889E uses an average of the previous three years. For example, in FY96, N889E uses actual Fuel, Maintenance and AVDLR costs for FY93, FY94 and FY95.

Any reduction in TRM flight hours would have a direct flight hour cost savings. The savings would essentially equal the product of the CPH times the number of TRM flight hours moved to a simulator.

C. SIMULATOR COSTS

There are two types of costs associated with flight simulators. The first is the investment cost or purchase price and the second is the operating costs. The most recent purchase price for the simulators identified earlier are as follows:

COMMUNITY	SIMULATOR	YEAR	COST PER SIM
F/A-18	WTT	1986	$ 57,206,116
SH-60B	OFT	1986	$ 18,000,000
SH-60B	WTT	1987	$ 14,000,000
P-3C	WST	1989	$ 11,861,785

Table 4.5 Purchase Price of Selected Flight Simulators [Ref. 19: p. 48], [Ref. 20]

The purchase price can be considered a sunk cost. The simulators have been paid for in full. Therefore, the only costs now associated with using the simulator are the operations costs.

The simulators are operated by outside civilian contractors. The costs attributed to operating the simulators are: Contractor Operation and Maintenance of Simulators (COMS), Aircraft Intermediate Maintenance Depot (AIMD) parts, Contracting Officer's Technical Representative (COTR), Contractor Simulator Instructor (CSI), contract mobilization, contract transition, and other. [Refs. 20 and 22] The sum of these costs, divided by the simulator contracted hours for the year yields the simulator operating cost rate. Even though there is a difference in actual and projected costs between the east and west coasts' costs because of "locality" costs, the amount the simulators are operated, and projected to operate on each coast are the quite similar. The differences in "locality" costs are not on the same scale as the amount of savings from reduced flight hour funding (i.e., thousands of dollars vs. millions of dollars). So, for the purposes of this thesis, the simulator operator costs per community are averaged and are listed in the following table:

COMMUNITY	SIMULATOR	FY96 HOURS	FY96 RATE	FY97 HOURS	FY97 RATE
F/A-18	WTT	2000	$423/HR	2000	$432/HR
SH-60B	OFT	4000	$265/HR	4000	$271/HR
SH-60B	WTT	3000	$270/HR	3000	$276/HR
P-3C	WST	3000	$200/HR	3000	$204/HR

Table 4.6 Average Simulator Operating Costs Rates [Refs. 20, 21 and 22]
(Note: SH-60B OFT and WTT rates must be summed for SH-60B WST rates)
(Note: FY96 and FY97 hours are per simulator)

D. COST COMPARISON

By calculating the flight hour costs for the TRM events identified in Chapter II and comparing the simulator costs for the same TRM events, a potential cost savings can be estimated.

1. F/A-18

If the seven funded flight events identified in Chapter II (Table 2.5) had been moved to the simulator in FY96, the potential flight hour cost savings for the community would have been:

(32.66 HRS/CREW) X ($3, 063 CPH) X (335.1 CREWS) = $33,522,593

(Note: The 335.12 aircrew figure was generated by taking the total number of aircraft (260) and subtracting the aircraft (24) in the 2 squadrons stationed in Japan. No simulator is available in Japan. The net aircraft are then multiplied by the CSR (1.42) (see Table 4.2)). The estimated FY97 flight hour cost savings would be:

(32.66 HRS/CREW) X ($2,977 CPH) X (340.8 CREWS) = $33,135,582

(Note: The 340.8 aircrew figure was generated by taking the total number of aircraft (276) and subtracting the aircraft in the 3 squadrons stationed in Japan (36). The net aircraft are then multiplied by the CSR (1.42) (see Table 4.3)).

The most realistic additional simulator cost is full operational cost recovery (rates from Table 4.6). The seven TRM events require 24 one hour simulator periods per crew (e.g., the WAG-9 (0.4 event hours) is required every 3 months. Since the simulator operates at a minimum of one hour periods, the qualification necessitates 4 one hour periods per year). The additional simulator costs for FY96 would have been:

(24 HRS/CREW) X ($423/HR) X (335.1 CREWS) = $3,401,935

The probable additional costs for FY97 would be:

(24 HRS/CREW) X ($432/HR) X (340.8 CREWS) = $3,533,414

If the identified flight events were moved into the simulator training environment at the beginning of FY96 the probable savings would have been:

$33,522,593 - $3,401,935 = $30,120,658

The probable savings for FY97 would be:

$33,135,582 - $3,533,414 = $29,602,168

There are an additional 8,179 simulator hours required in FY97 ((24 HRS/CREW) X (340.8 CREWS)) to conduct the seven qualifications in the simulator. To be able to absorb these hours, the amount of time the simulators are available for training must be increased. By increasing the operating hours from 8 HRS/DAY to 16 HRS/DAY would provide an additional 8000 hours of training availability ((4 WTTs) X (8 HRS) X (250 DAYS)) and still allow the contractors 8 hours of uninterrupted maintenance. If the F/A-18 community were able to increase their simulator usage rate from 83 percent in FY95 (Appendix E), to a 95 percent utilization rate (12 percent difference), then there would be an additional 960 hours available for training ((4 WTTs) X (2000 HRS/SIM) X (12 PERCENT)). Summing these available training hours equates to 8960 hours, which covers the 8,179 hours the simulators would have to be available to conduct the seven qualifications.

There also are potential simulator hours available if the community more closely monitors the training conducted in the simulators (i.e., only 21 percent of the scheduled non-SOF training is actually TRM tactical crew training (Table 3.3)). However, there will most likely be an increase in contracted simulator costs by some amount proportionate to the increase in simulator hours (i.e., from 8 hours to 16 hours a day).

2. SH-60B

There are two TRM events identified in Table 2.5 that are candidates to be conducted in the simulator. The potential flight hour cost savings for FY96 would have been:

(7.0 HRS/CREW) X ($1,082 CPH) X (261.1 CREWS) = $1,977,193

(Note: The 261.1 aircrew figure was calculated by multiplying the number of aircraft (115) times the CSR (2.27) (see Table 4.2)). The estimated flight hour cost savings for FY97 would be:

(7.0 HRS/CREW) X ($1,149 CPH) X (267.9 CREWS) = $2,154,398

(Note: The 267.9 aircrew figure was calculated by multiplying the number of aircraft (118) times the CSR (2.27) (see Table 4.3)).

The most likely additional costs associated with operating the WST system would be full cost recovery (rates from Table 4.6). For FY96, the additional costs would have been:

OFT: (7.0 HRS/CREW) X ($265/HR) X (261.1 CREWS) = $484,341
WTT: (7.0 HRS/CREW) X ($270/HR) X (261.1 CREWS) = $493,479
$977,820

The potential additional costs for FY97 would be:

OFT: (7.0 HRS/CREW) X ($271/HR) X (267.9 CREWS) = $508,206
WTT: (7.0 HRS/CREW) X ($276/HR) X (267.9 CREWS) = $517,583
$1,025,789

Since the OFTs are currently being operated the maximum 16 hours per day, the recommended proposal for absorbing the 1,875 ((7 HRS/CREW) X (267.9 CREWS)) additional simulator hours required to conduct the qualifications in FY97 would be to conduct training on Saturdays. This would generate an additional 3200 hours ((4 OFTs) X (16 HRS/DAY) X (50 DAYS)), which more than covers the FY97 requirement of 1,875 hours.

To account for the additional 1,875 hours required of the WTTs, the community could either conduct linked simulator training on Saturdays or increase the daily usage rate from 12 hours per day to 16 hours per day. If the community chose to utilize the WTTs on Saturdays, the additional available training time would be 4,800 hours ((6 WTTs) X (16 HRS/DAY) X (50 DAYS)). By choosing to increase the simulator hours operated per day, an additional 6000 hours ((4 HRS) X (6 WTTs) X (250 DAYS)) would be available to conduct qualifications.

The SH-60B community could avoid additional simulator costs by more efficiently using its simulators (i.e., increase its usage rate from 94 percent (Appendix E) or by closely monitoring the type of training being conducted in its simulators (i.e., 58 percent Tactical non-SOF training in the WST (Table 3.5)). As in the F/A-18 community, the contract costs would probably increase because of the additional hours required to operate the OFTs and WTTs.

The SH-60B community would also save on ordnance costs by not deploying sonobuoys, smokes and Sound Underwater Signal (SUS) devices. The ordnance costs for FY96 are listed in the following table:

ORDNANCE	COST	#/EVENT	AIRCREW	TOTAL COST
SSQ-53	$300.00	5	261.1	$ 391,650
SSQ-62	$959.45	17	261.1	$4,258,711
MK-25	$103.00	4	261.1	$ 107,573
MK-84	$220.00	2	261.1	$ 114,884
TOTAL				**$4,872,818**

SSQ-53 is a Passive sonobuoy
SSQ-62 is an Active sonobuoy
MK-24 is a Smoke
MK-84 is an underwater signal device (SUS)

Table 4.7 FY96 Annual Ordnance Cost Savings [Ref. 23]

The ordnance costs for FY97 are shown in the following table (assuming a 2.2 percent inflation rate on purchase price of ordnance):

ORDNANCE	COST	#/EVENT	AIRCREW	TOTAL COST
SSQ-53	$306.60	5	267.9	$ 410,691
SSQ-62	$980.56	17	267.9	$4,465,764
MK-25	$105.27	4	267.9	$ 112,807
MK-84	$224.84	2	267.9	$ 120,469
TOTAL				**$5,109,731**

SSQ-53 is a Passive sonobuoy
SSQ-62 is an Active sonobuoy
MK-24 is a Smoke
MK-84 is an underwater signal device (SUS)

Table 4.8 FY97 Annual Ordnance Cost Savings [Ref. 23]

If the identified TRM events had been moved to the simulator training environment, the savings for FY96 would have been:

$$\$1,977,193 + \$4,872,818 - \$977,820 = \$5,872,191$$

The potential savings for FY97 would be:

$$\$2,154,398 + \$5,109,731 - \$1,025,789 = \$6,238,340$$

Moving the nine TRM events for the F/A-18 and SH-60B communities to the simulator would also reduce the requirements for using training range

facilities. However, training range costs most likely would not change as an aggregate. The training range would probably recoup its lost revenues by raising the hourly rates for the remaining training events utilizing its facilities. Therefore, training range costs are considered fixed, and do not provide any additional savings to Naval Aviation.

E. READINESS IMPACT

The impact on operational training readiness by moving the nine events to the simulator would have two possible outcomes. First, because squadrons are not receiving enough funding to complete all flight qualifications (FY96: F/A-18 (86 percent PMR), SH-60B (84 percent PMR)), the money saved by moving the nine events into the simulator could be used to conduct those "must fly" events that would otherwise not be completed. Even though the nine events would be awarded less PMA readiness points than being conducted airborne, the squadron would receive full readiness points for "must fly" events that otherwise would not have been flown. The second possible outcome would be for CNAP/CNAL to review, and consequently increase, the amount of points awarded for these nine events when flown in the simulator. A comparison of operational readiness points in each PMA between completing the event in the simulator vice flying the events is shown in the following table:

		SIMULATOR PMA POINTS					IN-FLIGHT PMA POINTS				
	EVENT	AAW	ASU	STW	AMW	MIW	AAW	ASU	STW	AMW	MIW
F/A-18	WAG-9	0	1	0	0	5	0	3	1	0	10
	WAG-10	0	1	0	0	5	0	3	1	0	10
	WAG-16	0	1	1	0	0	0	3	2	0	0
	WAG-17	0	2	0	0	0	0	2	0	0	0
	WAG-19	0	1	0	0	0	0	2	1	1	0
	ACT-8	0	0	0	0	0	5	0	0	0	0
	ACT-9	0	0	0	0	0	5	0	0	0	0
TOTAL		0	6	1	0	10	10	13	5	1	20
	EVENT	ASW					ASW				
SH-60B	ASW-7	3.5					5				
	ASW-8	3.5					5				
TOTAL		7					10				

Table 4.9 PMA Readiness Points Comparison (Per Aircrew Per Year)

Using the information in Table 4.9, the reduction in PMA readiness points for conducting the qualification in the simulator for the F/A-18 community is: AAW (10), ASU (7), STW (4), AMW (1) and MIW (10). For the SH-60B community the reduction in PMA readiness points is ASW (3). When the simulator is used for these events, the communities are penalized from 50 to 100 percent full readiness points. These events, having been identified as being more effectively conducted in the simulator, should receive full readiness points. Those events that are considered "must fly" events should still be penalized when completed in the simulator.

F. SUMMARY

From a financial viewpoint, there are a tremendous potential savings in flight hour and ordnance costs by not funding seven F/A-18 and two SH-60B TRM events and conducting those qualifications in the simulator. The potential savings in FY97 would be over $29 million in the F/A-18 community and over $6 million in the SH-60B community. In addition, Naval Aviation has adopted a new TRM that requires additional events to maintain readiness in the updated PMAs (e.g., F/A-18 (32 H/C/M) vice (25

H/C/M)), but funding has not increased to meet these new requirements. Therefore, the rationale for moving the identified events to the simulator to complete the qualification is further justified. The impact on operational readiness is insignificant because the communities can complete qualifications that otherwise would not have enough funding.

V. CONCLUSIONS AND RECOMMENDATIONS

A. PURPOSE OF CHAPTER

This chapter answers the research questions developed in the first Chapter, and indicates potential areas that require future research.

B. RESEARCH QUESTIONS AND ANSWERS

1. Are there any operational readiness qualifications currently being conducted in the air better suited for the simulator training environment? Based on CNA studies and interviews with program and readiness officers, this thesis identified nine operational readiness qualifications (seven F/A-18 and two SH-60B) currently funded for flight that could effectively be conducted in simulators.

2. Would the increased use of simulators in Naval Aviation during operational readiness qualifications reduce the costs to the Department? By moving the nine operational readiness qualifications to the simulator training environment, the Navy would potentially save $35.8 million in FY97.

3. What are the costs associated with performing the qualifications in the simulator? In the air? The estimated average FY97 simulator operating costs per hour are: F/A-18 WTT ($432/HR); SH-60B OFT ($271/HR), WTT ($276/HR); and P-3C WST ($204/HR). These estimated simulator operating costs include: COMS, AIMD, COTR, CSI, contract mobilization and transition, and other. The annual estimated "conservative" CPH associated with performing the qualifications airborne are: F/A-18 ($2,977/HR); SH-60B ($1,149/HR); P-3C ($1,794/HR). The estimated CPH includes costs for fuel, maintenance, and repair.

4. Are there additional costs associated with moving the qualifications to the simulators? There would likely be additional costs due to the increase in the amount of time the simulator is operated. The estimated average

simulator operating costs for performing the nine qualifications in FY97 are: F/A-18 ($3.5 million) and SH-60B ($1 million). For the F/A-18 community, contract costs would probably increase further because the current WTT schedule would have to expand from 8 to 16 hours a day, 5 days a week. This would provide sufficient additional simulator time to encompass the seven qualifications moved from flight funding . The SH-60B community would also expect increased contractor costs from expanding their simulator operating hours from 5 to 6 days a week to absorb the two flight funded qualifications.

5. Do the simulators now have the equipment necessary to perform the qualification? According to the interviews conducted during thesis research, the simulators possess the necessary equipment to perform the recommended qualifications.

6. Are there a sufficient number of simulators available to perform the qualifications? There are sufficient simulators available to perform the nine recommended qualifications, if the squadrons increased the simulator operating hours, and simulator availability usage rate and closely monitored the type of training being conducted in the simulator.

7. What are the costs associated with purchasing additional simulators (if needed)? Since there is sufficient time available with the existing simulators, purchasing additional simulators is not necessary.

C. SUGGESTIONS FOR FURTHER RESEARCH

Based on arguments and facts presented in this thesis, the following recommendations are offered to help Naval Aviation and the Department of the Navy obtain better performance from its limited resources:

1. If the same methodology used in this thesis were applied to all Naval Aviation squadrons' TRMs, a significant fiscal savings is likely. Also, SOF qualifications should be analyzed for potential training events that could be effectively moved into the simulator. This thesis focused on only three Naval Aviation communities. However, the nine identified TRM

qualifications that fit the criteria to be moved into the simulator training environment, would save the Navy over $35 million in FY97. In these times of fiscal constraints, every resource should be utilized to its fullest capability.

2. The need to purchase additional simulators should be investigated. The savings from simply moving the seven F/A-18 events to the simulator ($29.6 million per year) would pay for a WTT within two years ($57.2 million purchase price in 1986).

3. The readiness points awarded for conducting TRM qualifications in the simulator should be reviewed. Some communities award reduced readiness points for simulator-based flight qualifications. The P-3C, with the oldest simulator, awards full PMA readiness points for qualifications completed in the WST. However, the F/A-18 community penalizes aircrews conducting qualifications in the WTT, awarding them from 0 to 80 percent of the total flight PMA readiness points. This community uses the newest state-of-the-art simulators.

4. Naval Aviation communities should look closely at the number of qualifications accomplished during each flight. The P-3C's TRM minimizes the flights funded for independent flight qualifications. Many events that must be conducted airborne require no flight hour funding. Instead, they are completed in conjunction with another airborne event. If every community designed their TRM to reflect conjunctive and independent qualifications, there would be significant financial savings for the Navy.

APPENDIX A

F/A-18 TRM

F/A-18 TRAINING MATRIX

EVENT #	TRAINING EVENT (EVENT CODE)	CREW REQD	QUALIFICATION	MAINTAIN QUAL	CURRENCY PERIOD (DAYS)	AAW	ASU	STW	AMW	MIW	MOB	CCC	EVT HRS	ANN HRS	NOTES	ORDNANCE	RESOURCE REQUIRE
1	FAM 1 NATOPS Check (F01/S01)		IAW NATOPS		Q + 1 yr						10 (10)				1		
2	FAM 2 Inst Check (F02/S02)		Check Event		Q + 1 yr						10 (10)				1		
3	FAM 3 FCF (F03)																
4	FAM 4 FCLP (F04)		IAW LSO NATOPS	Last Trap or FCLP + 180	Q + 60						10		2	12			
5	FAM 5 CQ (F05)		IAW LSO NATOPS	IAW LSO NATOPS	Q + 180						10		3	6			
6	FAM 6 In-Flight Refueling Day (F06)		6 Plugs	2 Plugs	Q + 90						5		0.5	2			Tkr
7	FAM 7 In-Flight Refueling Night (F07)		6 Plugs	2 Plugs	Q + 90						5		0.5	2			Tkr
8	FAM 8 In-Flight Refueling Day KC-135 (F08)		6 Plugs	2 Plugs	Q + 90						5		0.6	2.4			Tkr KC-135
9	FAM 9 In-Flight Refueling Night KC-135 (F09)		6 Plugs	2 Plugs	Q + 90						5		0.6	2.4			Tkr KC-135
10	NAV 1 Low Level NAV (20 Min) (F10)		1 Flight	1 Flight	Q + 60			1	1	10	5		0.8	4.8			VR Route
11	NAV 2 NVG/NFLIR Low Level (F11)		1 Low Level	1 Low Level	Q + 60			1	2	5	5		0.8	4.8			VR Route
12	NAV 3 Lat 10 Min Dive Rcvy 50% Rule (F12)		Lat Sim Lat Event	1 Low Level	Q + 60		1	1	1	2	5		1	6			Low alt MOA

F/A-18 TRAINING MATRIX

EVENT #	TRAINING EVENT (EVENT CODE)	CREW REQD	QUALIFICATION	MAINTAIN QUAL	CURRENCY PERIOD (DAYS)	AAW	ASU	STW	AMW	MIW	MOB	CCC	EVT HRS	ANN HRS	NOTES	ORDNANCE	RESOURCE REQUIRED
13	NAV 4 Lat Sim (S13)		Lat Lecture		Q + 90		(1)	(1)	(1)	(2)					2		WTT
14	NAV 5 Airways Nav (F14/S14)		1 Event - land at non-local field	1 Event - land at non- local field	Q + 90						5 (1)		2	8	1		
15	NAV 6 ACLS (F15/S15)		4 Approaches	2 Approaches	Q + 120						5 (2)		1	3	1		ACLS
16	WAA 1 A/A Gun Valid Shot (F16)		3 Shots	3 Shots	Q + 60	2									4		
17	WAA 2 AIM 7 Valid Shot (F17)		5 Shots	5 Shots	Q + 30	2									4		
18	WAA 3 AIM 120 Valid Shot (F18)		5 Shots	5 Shots	Q + 30	2									4		
19	WAA 4 AIM 9 Valid Shot (F19)		5 Shots	5 Shots	Q + 30	2									4	CATM-9	MOA/W Area
20	WAA 5 A/A Banner (F20/S20)		5 Runs	5 Runs	Q + 12 Mos	2 (1)							0.3	0.3	1, 5	250 20mm	A/A Banner Tow Acft
21	WAA 6 A/A Radar Live Shot (F21)		1 Shot	1 Shot	Q + 36 Mos	2						2	0.5	0.1		AIM-7 AIM-120	MOA/W Area Tgt/ Drone
22	WAA 7 A/A IR Live Shot (F22)		1 Shot	1 Shot	Q + 36 Mos	2						2	0.5	0.1		AIM-9	MOA/W Area Tgt/ Drone
23	WAG 1 Visual Laydown Low Alt <1K AGL (F23/S23)		3 Runs	3 Runs	Q + 90		2 (1)	1		10 (5)			0.3	1.2	1, 5		Tgt Area

F/A-18 TRAINING MATRIX

EVENT #	TRAINING EVENT (EVENT CODE)	CREW REQD	QUALIFICATION	MAINTAIN QUAL	CURRENCY PERIOD (DAYS)	AAW	ASU	STW	AMW	MIW	MOB	CCC	EVT HRS	ANN HRS	NOTES	ORDNANCE	RESOURCES REQUIRED
24	WAG 2 Visual Low Angle Dive <30 Deg (F24/S24)		3 Runs	3 Runs	Q + 90		2 (1)	1 (1)	4 (1)				0.3	1.2	1, 5		Tgt Area
25	WAG 3 Visual High Angle Dive >30 Deg (F25/S25)		6 Runs	6 Runs	Q + 90		4 (1)	3 (1)	4 (1)				0.6	2.4	1, 5		Tgt Area
26	WAG 4 Ultra High Delivery >15K AGL (F26/S26)		6 Runs	6 Runs	Q + 90		2 (1)	3 (1)	4 (1)				0.7	2.8	1, 5		Tgt Area
27	WAG 5 Night Visual Delivery (F27)		6 Runs	3 Runs	Q + 60		2	2	2				0.4	2.4	5		Tgt Area
28	WAG 6 NVG Visual Delivery (F28/S28)		6 Runs	3 Runs	Q + 60		3 (1)	2 (1)	3 (1)	1			0.5	3	1, 5		Tgt Area
29	WAG 7 Delivey w/Tgt Lit by Para Flare (F29)		3 Runs	3 Runs	Q + 12 Mos		2	1	1				0.3	0.3	5		Tgt Area LUU-2
30	WAG 8 Moving Tgt (F30/S30)		3 Runs	3 Runs	Q + 120		3 (1)	1	3				0.3	0.9	1, 5		Tgt Area Moving Tgt
31	WAG 9 Radar Delivery (F31/S31)		3 Runs	3 Runs	Q + 90		3 (1)	1		10 (5)			0.4	1.6	1, 5		Tgt Area
32	WAG 10 Radar Offset Delivery (F32/S32)		3 Runs	3 Runs	Q + 90		3 (1)	1		10 (5)			0.4	1.6	1, 5		Tgt Area
33	WAG 11 FLIR Delivery (F33/S33)		6 Runs	6 Runs	Q + 60		3 (1)	2 (1)	3 (1)				1	6	1, 5		Tgt Area

F/A-18 TRAINING MATRIX

EVENT #	TRAINING EVENT (EVENT CODE)	CREW REQD	QUALIFICATION	MAINTAIN QUAL	CURRENCY PERIOD (DAYS)	AAW	ASU	STW	AMW	MIW	MOB	CCC	EVT HRS	ANN HRS	NOTES	ORDNANCE	RESOURCE REQUIRE
34	WAG 12 FLIR Laser Desig (F34/S34)		6 Runs	6 Runs	Q + 60		3 (1)	2 (1)	3 (1)				1	6	1		Laser Capbl Tgt Are
35	WAG 13 LST Designate (F35/S35)		3 Runs	3 Runs	Q + 180		3 (1)	2 (1)	3 (1)				0.3	0.6	1		Laser Capbl Tgt Are
36	WAG 14 Strike Camera (F36)		3 Runs	3 Runs	Q + 12 Mos			1	1				0.5	0.5			Film Tgt Area
37	WAG 15 HARM Simulator (S37)		6 Shots	6 Shots	Q + 90		(1)	(1)	(1)						2		WTT
38	WAG 16 HARM Captive Carry (F38/S38)		6 Shots	6 Shots	Q + 90		3 (1)	2 (1)					1	4	1	AGM-88	EW Emitter
39	WAG 17 HARPOON Captive Carry (F39/S39)		2 Runs	2 Runs	Q + 180		2 (2)						0.5	1	1	HARPOON	
40	WAG 18 IR Maverick Captive Carry (F40/S40)		6 Shots	6 Shots	Q + 180		2 (1)	1	1				1	2	1, 4	IR MAV	Tgt Area
41	WAG 19 Laser Maverick Captive Carry (F41/S41)		6 Shots	6 Shots	Q + 180		2 (1)	1	1				1	2	1	Laser MAV	Laser Capbl Tg
42	WAG 20 IR/Laser Maverick Sim (S42)		6 Shots	6 Shots	Q + 180		(1)	(1)	(1)						2		WTT
43	WAG 21 Slam/Pod Captive Carry (F43)		3 Shots	3 Shots	Q + 180			1					0.5	1		Slam, AAW Pod	Tgt Area MOA/W Area
44	WAG 22 Slam/Pod Sim (S44)		3 Shots	3 Shots	Q + 180			(1)							2		WTT
45	WAG 23 WALLEYE Sim (S45)		6 Shots	6 Shots	Q + 180		(1)	(1)							2		WTT

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F/A-18 TRAINING MATRIX

EVENT #	TRAINING EVENT (EVENT CODE)	CREW REQD	QUALIFICATION	MAINTAIN QUAL	CURRENCY PERIOD (DAYS)	AAW	ASU	STW	AMW	MIW	MOB	CCC	EVT HRS	ANN HRS	NOTES	ORDNANCE	RESOURCE REQUIRED
46	WAG 24 WALLEYE/Pod Captive Carry (F46/846)		6 Shots	6 Shots	Q + 180		2 (1)	1 (1)					1	2	1, 4	WE Pod	Tgt Area
47	WAG 25 MK-76/BDU-48 Practice Inert Ordnance (F47)		24 Drops	24 Drops	Q + 60		5	2	4	5						144 MK-76/ BDU-48	Tgt
48	WAG 26 MK-80 Series Inert (F48)		16 Drops	8 Drops	Q + 180		4	2	4	10						16 Inert MK-80 Series	Tgt
49	WAG 27 MK-80 Series Live (F49)		4 Drops	4 Drops	Q + 180		4	2	4	4						8 Live MK-80 Series	Tgt
50	WAG 28 Rockets (F50)		4 Shots	4 Shots	Q + 18 Mos		1	1	1							2.7 Rockets	Tgt
51	WAG 29 Cluster Weapons (F51)		1 Drop	1 Drop	Q + 18 Mos		1	1	2							.66 CBU	
52	WAG 30 LGB (F52)		1 Drop	1 Drop	Q + 18 Mos		1	1	2							.66 LBG	Laser Capbl Tg
53	WAG 31 LGTR (F53)		4 Drops	4 Drops	Q + 180		1	2	2							8 LGTRs	Laser Capbl Tg
54	WAG 32 Mine DST (F54)		2 Drops	2 Drops	Q + 18 Mos					10						1.7 Destruc-tors	Mine Range
55	WAG 33 HARM Shoot (F55)		1 Shot	1 Shot	Q + 10 Yrs		1	1								.1 HARM	Emitter Tgt
56	WAG 34 HARPOON Shoot (F56)		1 Shot	1 Shot	Q + 10 Yrs		1	1								.1 HARPOON	Tgt
57	WAG 35 IR MAVERICK Shoot (F57)		1 Shot	1 Shot	Q + 10 Yrs		1	1	1							.1 IR MAV	Tgt
58	WAG 36 Laser MAVERICK Shoot (F58)		1 Shot	1 Shot	Q + 10 Yrs		1	1	1							.1 Laser MAV	Laser Capbl Tg
59	WAG 37 SLAM Shoot (F59)		1 Shot	1 Shot	Q + 10 Yrs		1	1	1							.1 SLAM/ Pod	Tgt

Enclosure

F/A-18 TRAINING MATRIX

EVENT #	TRAINING EVENT (EVENT CODE)	CREW REQD	QUALIFICATION	MAINTAIN QUAL	CURRENCY PERIOD (DAYS)	AAW	ASU	STW	AMW	MIW	MOB	CCC	EVT HRS	ANN HRS	NOTES	ORDNANCE	RESOURC REQUIRE
60	WAG 38 TALD Drop (F60)		1 Drop	1 Drop	Q + 36 Mos		1	1								.33 TALD	Tgt
61	WAG 39 WALLEYE Drop (F61)		1 Drop	1 Drop	Q + 10 Yrs		1	1								.1 WE	Tgt
62	WAG 40 A/G Strafe (F62)		3 Runs	3 Runs	Q + 60		1	1	2							4500 Rds	Tgt
63	ACT 1 1 V 1 Similar or Dissimilar (F63)		4 Engagements	2 Engagements	Q + 30	3							0.5	6		CATM-9	MOA
64	ACT 2 1 V 1 Dissimilar (F64)		3 Emgagements	3 Engagements	Q + 60	3							0.5	3		CATM-9	MOA
65	ACT 3 2 V 1/2 V 2 (F65)		3 Engagements	3 Engagements	Q + 60	4						1	0.5	3	3	CATM-9	MOA/W Area
66	ACT 4 2 V 2/Unk Intercept Escort VID (F66/S66)		6 Intercepts	2 Intercepts	Q + 60	4 (1)						1	0.8	4.8	1, 3	CATM-9	MOA/W Area
67	ACT 5 4 V 2/Unk Intercept Escort VID (F67)		6 Intercepts	2 Intercepts	Q + 60	4						1	0.8	4.8	3	CATM-9	MOA/W Area
68	ACT 6 AIC (F68/S68)		4 Intercepts	2 Intercepts	Q + 60	3 (1)						1	0.5	3	1, 3	CATM-9	MOA/W Area
69	ACT 7 Screened Tgt Intercept (F69)		3 Intercepts	2 Intercepts	Q + 120	3						5	0.5	1.5		CATM-9	MOA/W Area Jam Acft
70	ACT 8 CAP (F70)		4 Scenarios	2 Scenarios	Q + 90	5						3	0.5	2	3	CATM-9	MOA/W Area
71	ACT 9 Sweep (F71)		4 Scenarios	2 Scenarios	Q + 90	5						3	0.5	2	3	CATM-9	MOA/W Area

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F/A-18 TRAINING MATRIX

EVENT #	TRAINING EVENT (EVENT CODE)	CREW REQD	QUALIFICATION	MAINTAIN QUAL	CURRENCY PERIOD (DAYS)	AAW	ASU	STW	AMW	MIW	MOB	CCC	EVT HRS	ANN HRS	NOTES	ORDNANCE	RESOURCE REQUIRE
72	ACT 10 High Fast Intercept 40K 1.0M (F72/S72)		3 Intercepts	3 Intercepts	Q + 120	2 (1)						1	0.5	1.5	1	CATM-9	Super-sonic M Add'l Acft
73	ACT 11 Low Speed Intercept <1K 150KTS (F73/S73)		3 Intercepts	3 Intercepts	Q + 120	3 (1)						1	0.5	1.5	1	CATM-9	Low Alt MOA Low/Slo Acft
74	ACT 12 NVG Intercept/ VID (F74)		4 Intercepts	2 Intercepts	Q + 60	3						1	0.5	3		CATM-9	NVG Add'l Acft
75	ACT 13 Radar Missile Defense (F75/S75)		4 Engagements	2 Engagements	Q + 60	2 (1)									1		Add'l Acft
76	ACT 14 IR Missile Defense (F76)		4 Engagements	2 Engagements	Q + 60	2											Add'l Acft
77	ACT 15 Flare (F77)		20 Rounds	20 Rounds	Q + 60	2		2								120 Flares	MOA/W Area
78	ACT 16 Chaff (F78)		40 Rounds	40 Rounds	Q + 60	2		2								240 Chaff	MOA/W Area
79	STK 1 FAD (F79)		1 Scenario	1 Scenario	Q + 180	1						5	1.5	3		CATM-9	C3 Platform
80	STK 2 MSI (F80/S80)		16 Intercepts	16 Intercepts	Q + 60	4 (1)						5 (1)	2	12	1, 3		
81	STK 3 Coord WAS (F81)		1 Scenario	1 Scenario	Q + 180		5					4	1	2	5	CATM (A/G)	
82	STK 4 Day CAS (F82)		6 Runs	3 Runs	Q + 90			4	10			8	0.8	3.2	5		FAC Tgt Area
83	STK 5 Night CAS (F83)		6 Runs	3 Runs	Q + 90			4	10			8	0.8	3.2	5		FAC Tgt Area
84	STK 6 Mining (F84/S84)		2 Runs	2 Runs	Q + 180					15 (15)			1	2	1		Mining Range

F/A-18 TRAINING MATRIX

EVENT #	TRAINING EVENT (EVENT CODE)	CREW REQD	QUALIFICATION	MAINTAIN QUAL	CURRENCY PERIOD (DAYS)	AAW	ASU	STW	AMW	MIW	MOB	CCC	EVT HRS	ANN HRS	NOTES	ORDNANCE	RESOURCES REQUIRED
85	STK 7 Section Profile (F85/S85)		4 Runs	2 Runs	Q + 60	3 (1)	2	2	1	2		1	1.2	7.2	1		Tgt Area
86	STK 8 Division Profile (F86)		4 Runs	2 Runs	Q + 60	3	1	2	1	1		1	1.2	7.2			Tgt Area
87	STK 9 Opposed Ingress (F87)		2 Runs	2 Runs	Q + 60	3	2	2				1	1.2	7.2			Tgt Area Add'l Acft
88	STK 10 Section Profile Night (F88)		2 Runs	2 Runs	Q + 60	2	2	2	1	2		1	1.2	7.2			Tgt Area
89	STK 11 Division Profile Night (F89)		2 Runs	2 Runs	Q + 60	2	2	2	1	1		1	1.2	7.2			Tgt Area
90	STK 12 Tactical Tgt Acquisition Day (F90/S90)		6 Runs	6 Runs	Q + 30		1 (1)	2	2 (1)				0.5	6	1, 4		Tgt Area
91	STK 13 Tactical Tgt Acquisition Night (F91/S91)		6 Runs	3 Runs	Q + 30		2 (1)	2	4 (2)				0.5	6	1, 4		
92	STK 14 CSAR (F92)		1 Event	1 Event	Q + 180		1					7	0.8	1.6			MOA
93	STK 15 SSC (F93)		1 Event	1 Event	Q + 12 Mos		4					4	1.5	1.5			
94	STK 16 CVW Fallon DET (F94)		Complete		Q + 18 Mos	6		10	4		6	5					
95	STK 17 A/A SFARP (F95)		Complete		Q + 18 Mos	10		2				2					
96	STK 18 A/G SFARP (F96)		Complete		Q + 18 Mos	1	2	6	2			2					

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Enclosure (3)

F/A-18 TRAINING MATRIX

EVENT #	TRAINING EVENT (EVENT CODE)	CREW REQD	QUALIFICATION	MAINTAIN QUAL	CURRENCY PERIOD (DAYS)	AAW	ASU	STW	AMW	MIW	MOB	CCC	EVT HRS	ANN HRS	NOTES	ORDNANCE	RESOURC REQUIRE
97	STK 19 Joint Ops/ Exercise (F97)		2 Events	2 Events	Q + 180							8					
98	STK 20 Integrated CVW Training (F98)		2 Events	2 Events	Q + 90						5	5					
99	EWA 1 Comm Jam (F99)		1 Event	1 Event	Q + 12 Mos	1						5					Jam Platfor
100	EWA 2 EMCON Launch or Recovery (C00)		1 Launch or Recover	1 Launch or Recovery	Q + 12 Mos						2 (1)	5 (1)			1		
101	EWA 3 SAM Defensive EW (C01/SC1)		1 Event	1 Event	Q + 180						2 (1)		0.5	1	1		Surface, Ship Emitter

F/A-18 TRAINING MATRIX NOTES

1. Simulator may be used for training. PMA points may be obtained for amount shown in parentheses ( ) for currency period.
2. Simulator required for PMA points.
3. TACTS should be utilized to the maximum extent possible.
4. Video tape validation required.
5. NDBS or video tape validation may be used if ordnance is not practical or unavailable.
6. "FXX" and "CXX" are flight events. "SXX" and "SCX" are simulator events.

F/A-18 TRAINING MATRIX

INDIVIDUAL AIRCREW SUMMARY

TOTAL ANNUAL EVENT HOURS:		210.0
TOTAL MONTHLY EVENT HOURS:	(210.0/12)	17.50
AVERAGE HOURS/SORTIE:	(NAMP AVG)	1.40
AVERAGE TRANSIT TIME:		0.6
AVERAGE EVENT HOURS/SORTIE:	(1.4 - 0.6)	0.8
TOTAL ANNUAL SORTIES:	(210.0/0.8)	262.5
TOTAL MONTHLY SORTIES:	(262.5/12)	21.88
MONTHLY SUPPORT HOURS:		
TRANSIT TIME:	(21.88 X 0.6)	13.13
PMCF:		1.5
TOTAL MONTHLY HOURS:	(17.50 + 13.13 + 1.5)	32.13
TOTAL ANNUAL HOURS:	(32.13 X 12)	385.56

ANNUAL ORDNANCE:

CATM-9 PRESENTATIONS	67	TALD	0.33
20MM	3000	DST	1.7
AIM-9	0.33	HARM	0.1
AIM-7/120	0.33	IR MAVERICK	0.1
MK-76/BDU-48	144	LASER MAVERICK	0.1
MK-80 INERT	16	SLAM	0.1
MK-80 LIVE	8	WALLEYE	0.1
ROCKETS	2.7	FLARES	120
CLUSTER	0.66	CHAFF	240
LGB	0.66		
LGTR	8		

FA-18 SQUADRON SUMMARY
(BASED ON 17 CREWS)

ANNUAL FLIGHT HOURS:	6554.52
ANNUAL SORTIES:	4462.50

ANNUAL ORDNANCE:

CATM-9 PRESENTATIONS	1139	TALD	5.6
20MM	51000	DST	28.9
AIM-9	5.6	HARM	1.7
AIM-7/120	5.6	IR MAVERICK	1.7
MK-76/BDU-48	2448	LASER MAVERICK	1.7
MK-80 INERT	272	SLAM	1.7
MK-80 LIVE	136	WALLEYE	1.7
ROCKETS	45.9	FLARES	2040
CLUSTER	11.2	CHAFF	4080
LGB	11.2	LGTR	136

APPENDIX B

SH-60B TRM

SH-60B TRAINING MATRIX

Flight #	TRAINING Flight (EVT CODE)	CREW REQD	QUALIFICATION	MAINTAIN QUAL	CURRENCY PERIOD (DAYS)	ASU	ASW	C2W	CCC	MOB	EVT HRS	ANN HRS	NOTES	ORDNANCE	RESOURCES REQUIRED
1	FAM 1 NATOPS Check (F01)	PAC AW	1 Flight	Annual Flt Check	Q + 365						2.5	2.5	1,3		
2	FAM 2 Inst Check (F02/S02)	PAC	1 Flight	Annual Check	Q + 365						2.5	2.5	1,3		TR
3	FAM 3 Day Dopp (F03)	PAC AW	3 App 1 Sim Pickup	2 App 1 Sim Pickup	Q + 60					10 AW5	2	12	3,5,14	MK25:4 or MK58:2	
4	FAM 4 Night Dopp (F04)	PAC AW	3 App 1 Sim Pickup	2 App 1 Sim Pickup	Q + 60					10 AW5	2	12	3,5,14	MK25:4 or MK58:2	
5	FAM 5 Day Jumps (F05)	AW	1 Flight	6 Jumps	Q + 365					AW10	2	2	4		
6	FAM 6 Night Jumps (F06)	AW	1 Flight	2 Jumps	Q + 365					AW10	2	2	4		
7	FAM 7 SAREX (F07)	Pac ATO AW	OSC	OSC	Q + 90				10	7	2.5	10	FSO-1-A 1	MK25:4 or MK58:2	
8	FAM 8 HIFR (F08)	PAC AW	2 HIFR (1 WET)	2 HIFR	Q + 365					5 AW10	3.5	3.5	MOB S-15-SF 3		SFC
9	FAM 9 External Cargo/Hoist (F09)	PAC AW	6 Picks 2 Hoist	3 Picks 2 Hoist	Q + 180					10 AW15	2.5	5	MOB S-8-SF; 3		SFC/PAD
10	FAM 10 Day RLQ (F10)	PAC AW	1 Flight 5 RA	2 RA	Q + 60					7 AW2	2	12	MOB 6-13-SF 1,3,5, 14		SFC
11	FAM 11 Day RLQ (F11)	PAC AW	1 Flight 5 FD	2 FD	Q + 60					7 AW2	2	12	MOB 6-13-SF 1,3,5, 14		SFC
12	FAM 12 Nite RLQ (F12)	PAC AW	1 Flight 5 RA	2 RA	Q + 60					7 AW2	2	12	MOB S-13-SF 1,3,5, 14		SFC

SH-60B TRAINING MATRIX

Flight #	TRAINING Flight (EVT CODE)	CREW REQD	QUALIFICATION	MAINTAIN QUAL	CURRENCY PERIOD (DAYS)	ASU	ASW	C2W	CCC	MOB	EVT HRS	ANN HRS	NOTES	ORDNANCE	RESOURCES REQUIRED
13	FAM 12 Nite RLQ (F13)	PAC AW	1 Flight 5 FD	2 FD	Q + 60					7 AW2	2	12	MOB 8-13-SF 1,3,5, 14		SFC
14	FAM 14 Formation (F14)	PAC AW	1 Flight		Q + 365					3	3.5	3.5	3		
15	FAM 15 BAW/EMRG (F15/S15)	P ATO AW	1 Flight	3 Events	Q + 30						3	108	AW (OPTION- AL)		TR
16	FAM 16 PQS (F16)	P ATO AW	Fleet Sqd	6 Events	Q + 365						3	18			
17	NAV 1 Airways Nav (F17)	PAC	1 Flight		Q + 180					3	3.5	7	1,2,3,13		
18	NAV 2 RI/BI (F18/S18)	PAC	1 Flight	3 app 6 BI EVENTS	Q + 90					5	3.5	14	2,3		TR
19	NAV 3 Ship Inst App (F19/S19)	PAC	2 TACAN	1 TACAN	Q + 60					3	1	6	2,3,12		TR,O/S
20	NAV 4 Ship Inst App (F20/S20)	PAC	2 ELVA	1 ELVA	Q + 60					3	1	6	2,3		TR,O/S
21	NAV 5 Day VFR Nav (F21)	PAC ATO			Q + 180					5	3.5	7	2,13		
22	NAV 6 Night VFR Nav (F22)	PAC ATO			Q + 180					5	3.5	7	2,13		
23	NAV 7/HET 1 Contact Nav (F23)	PAC ATO			Q + 365	3					3.5	3.5			AR
24	ASU 1 OTH-T Air/Surv (F24)	P ATO AW	1 Flight		Q + 180	15		5	5 AW10		3.5	7			SFC
25	ASU 2 Penguin Attack (F25)	P ATO AW	Fleet Sqdn		Q + 365	10		5	5 AW10		3	3	7,9	SSQ53:5	SFC,CATM IR, *OPTIONAL

osure (11)

SH-60B TRAINING MATRIX

Flight #	TRAINING Flight (EVT CODE)	CREW REQD	QUALIFICATION	MAINTAIN QUAL	CURRENCY PERIOD (DAYS)	ASU	ASW	C2W	CCC	MOB	EVT HRS	ANN HRS	NOTES	ORDNANCE	RESOURCES REQUIRED
26	ASU 3 STRIKE CONTROL (F26/S26)	P ATO AW			Q + 180	15		5	10		3.5	7			SFC,SP, AH,TR
27	ASU 4 PHOTEX (F27)	P ATO AW			Q + 365	5					2	2			SFC
28	ASU 5 NGFS (F28)	P ATO AW			Q + 365	5			2		3.5	3.5			SFC,AR
29	ASU 6 GUNEX (F29)	PAC ATO AW	1 Flight 600 rds	400 rounds	Q + 90 PAC/ATO Q+365	5 AWS					3.5	14		7.62 mm 1 MK58 or 2 MK25	
30	ASU 7/HET 4 Breaklock (F30)	PAC ATO AW			Q + 365	3		10			3.5	3.5		ALE 39 CHAFF:40 FLARES:20	AR
31	ASU 8 RECCE (F31)	PAC ATO AW			Q + 365	10	2	2							
32	ASU 9/AAW 1 ASMDEX (F32)	P ATO AW			Q + 365			10	10		3.5	3.5	AAW-23-8	4 AIRBOC	O/S, SFC CM
33	ASW 1 Coord DATUMEX/ Nuc GRADEX (F33/S33)	P ATO AW	1 Flight		Q + 180		15	5	10		3.5	7	ASW-2-I ASW-12-I ;6,11	SSQ53:14/ SSQ62:8 SSQ77:X/ SSQ36:1 MK84:2/ MK25:4	Sub, Tgt TR,O/S, DPT
34	ASW 2 Shallow Water/Diesel GRADEX (F34/S34)	P ATO AW	1 Flight		Q + 180		15	10	5		3.5	7	ASW-5-I ASW-11-A 6,11	SSQ53:5/ SSQ62:17 SSQ36:1 MK84:2/ MK25:4	Sub, Tgt TR
35	ASW 3 Air COORDEX (F35/S35)	P/ATO/AW	1 Flight		Q + 365		10	5	5		3.5	3.5	ASW-12-I 6, 11	SSQ53:10/ SSQ62:10 SSQ77:X SSQ36:1 MK84:2 MK25:4	Sub, Tgt TR, O/S
36	ASW 4 CZ EX (F36/S36)	PAC ATO AW	1 Flight		Q + 365		5				3.5	3.5	ASW-38- SF; 6, 11	SSQ53:15/ SSQ62:5 SSQ38:1/ MK84:2 MK25:4	Sub, Tgt TR, O/S

SH-60B TRAINING MATRIX

Flight #	TRAINING Flight (EVT CODE)	CREW REQD	QUALIFICATION	MAINTAIN QUAL	CURRENCY PERIOD (DAYS)	ASU	ASW	C2W	CCC	MOB	EVT HRS	ANN HRS	NOTES	ORDNANCE	RESOURCES REQUIRED
37	ASW 5 TORPEX (F37)	PAC ATO AW			Q + 365		20		5		3	3	ASW-7-A; 7,8,11	SSQ53:10/ SSQ62:10 SSQ77:X SSQ38:1 MK84:2 MK25:4	Sub, Tgt
38	ASW 6 Ship/Air TEAMEX (F38)	PAC ATO AW			Q + 365		10	5	5		3.5	3.5	ASW-43-SF 11	SSQ53:10/ SSQ62:10 SSQ77:X SSQ36:1 MK84:2 MK25:4	Sub, Tgt O/S
39	ASW 7 RADEX (F39/S39)	PAC ATO AW			Q + 365		5				3.5	3.5	ASW-2-A 6		Sub, Small Boat, TR
40	ASW 8 MACTEX (F40/S40)	PAC ATO AW			Q + 365		5				3.5	3.5	ASW-3-A; 6	SSQ53:5/ SSQ62:17 MK25:2 MK25:4	Sub, Tgt TR
41	AAW 1/HET 2 Helo vs Helo (F41)	PAC ATO AW			Q + 365	3					3.5	3.5	10		AR
42	AAW 2/HET 3 Helo vs Fixed (F42)	PAC ATO AW			Q + 365	3					3.5	3.5	10		AR
43	CCC 1 Comm Relay (F43)	P/ATO	2 UHF	2 UHF	Q + 365				15		2	2	15		O/S, SFC
44	CCC 2/C2W 1 IFF TRACKEX (F44/S44)	P ATO AW	1 Flight		Q + 180	5		10	10		2.5	5			TR
45	CCC 3/C2W 2 ESMEX (F45/S45)	P ATO AW	1 Flight		Q + 180	10	10	10			2.5	5			SFC,AR,TR
46	CCC 4/C2W 3 EMCON (F46)	P ATO AW			Q + 365	5		15	5 AW10		2.5	2.5 *			SFC
47	CCC 5 Joint/Allied Training (F47)	PAC ATO AW			Q + 365	3	3	3	3	3					SHARP

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SH-60B TRAINING MATRIX NOTES

All requirements for training events IAW TYPEWING directives. Fleet exercises publications (FXPs) references in notes section when appropriate.

Notes:

1. Requirements IAW SH-60B NATOPS Flight Manual and OPNAVINST 3710.7.

2. Pilot Qualification only. AWs receive full readiness points.

3. PAC - Pilot at controls. Qualification points may be earned by either pilot regardless of seat position, provided the pilot actually performs the required maneuver. Both the HAC and H2P are expected to achieve this qualification.

4. AW qualification only.

5. AW currency period is Q + 180.

6. Full readiness points are awarded for events conducted in the helicopter. Qualfications completed using approved trainers (i.e., 2F135, 2F139, 14B51), OBT and DPT are valid for the full currency period and 70% of the readiness points. OBT and DPT credit counts for on-deck as well as in-flight operations. ReQUALs following a QUAL obtained in an approved trainer shall be flown in the aircraft.

7. Each crew shall complete a trainer event no more than 30 days prior to actual qualfication. Initial QUAL should be flown w/MK46/MK50/EXTORP/REXTORP or Penguin CATM. SUS for reattack for the
ASW-7.

8. The TYPEWING Commander may approve completion of an ASW-7-A qualification in an approved trainer (i.e., 2F139(wst)). Every reasonable attempt must first be made to accomplish the qualification in the aircraft.

9. Readiness points are waived for non-Penguin-capable detachments. Penguin capabilities and tactics shall be understood by all LAMPS aircrews.

10. Aircraft restrictions currently prohibit HET 2 and HET 3. Do not count points until flight restrictions are lifted. Calculate readiness points based on a percentage of total available points in the mission area.

11. VLAD Buoys (SSQ77) may be substituted for DIFAR Buoys (SSQ53) when environmental conditions favor their use.

12. Discuss Smokelight approach procedures IAW NWP-42.

13. Readiness points are waived on long deployment (greater than 90 days).

14. Satisfying night currency/requalification requirements fulfills both day and night currency/requalification requirements.

15. Pilot qualification only.

Resource Requirements Key: SUB=submarine; TGT=MK30/MK39 EMATT; TR=approved trainer including OBT; DPT=deployable proficiency trainer; O/S=CG, DD, FFG with embarked LAMPS detachment; SFC=O/S or surface unit used as flight deck, target, NSFS ship or ESM emitter platform, AR=approved range (Cherry Point, Camp Pendleton, Fallon, etc.); IR=instrumented range (AUTEC, SCORE, BARKING SANDS, etc.); SP=CVW asset-strike package; AH=armed HELO; CM=SIM cruise missile.

SH-60B TRAINING MATRIX

INDIVIDUAL AIRCREW SUMMARY

ANNUAL FLIGHT HOURS: 365.0
MONTHLY FLIGHT HOURS: 30.42
ANNUAL ORDNANCE:

MK 46/50 TORPEDO	1	SSQ-36 SONOBUOYS	8
MK-39 EMATT	9	SSQ-53 SONOBUOYS	93
7.62 AMMO	1800	SSQ-62 SONOBUOYS	102
MK 25 MARINE MARKER	114	SSQ-77 SONOBUOYS	4
MK 58 MARINE MARKER	40	ALE-39 CHAFF	40
MK 84 SUS	18	ALE-39 FLARES	20
SMOKEY SAMS	4	AIRBOC	4

SQUADRON SUMMARY
(BASED ON 29/20 CREWS)

ANNUAL FLIGHT HOURS: 10,585.0/7,300.0
MONTHLY FLIGHT HOURS: 882.18/608.4
ANNUAL ORDNANCE:

MK 46/50 TORPEDO	29/20	SSQ-36 SONOBUOYS	232/160
MK-39 EMATT	261/180	SSQ-53 SONOBUOYS	2,697/1,860
7.62 AMMO	52,200/36,000	SSQ-62 SONOBUOYS	2,958/2,040
MK 25 MARINE MARKER	3,306/2,280	SSQ-77 SONOBUOYS	116/80
MK 58 MARINE MARKER	1,160/800	ALE-39 CHAFF	1,160/800
MK 84 SUS	522/360	ALE-39 FLARES	580/400
SMOKEY SAMS	116/80	AIRBOC	116/80

APPENDIX C

P-3C TRM

P-3 TRAINING MATRIX

EVT #	TRNG EVT/ (FLIR)	CREW REQUIRED	QUALIFICATION/CURRENCY	Qual/ Curr Pd (Mths)	ASU	ASW	CCC	C2W	INT	MIW	MOB	EVT HRS	NOTES	REQUIRED ORDNANCE	RESOURCES REQUIRED
1	ASU1 (MULT) TC01	PPC, PP2P PPTC, PPN, SS3	MAVERICK MISSILEX QUAL ASU-5-A--Conduct Maverick engagement vs surface target using AGM65 or CATM.	18	3	0	0	0	2	0	0	10	1	2 AGM65/CATM	TARGET, SURFACE
2	ASU2 (MULT) TC02	PPC, PPTC, PPNC, SS3	HARPOON MISSILEX QUAL ASU-5-A--Conduct Harpoon engagement vs surface target using AGM84, CATM-H or HETA.	18	[3]	0	0	[4]	[2]	0	0	(10)	2, 3	1 AGM84/ATM84/ CATM-H	TARGET, SURFACE
3	ASU3 (MULT) TC03	PPC, PPTC, ORD	BOMBEX QUAL ASW-6-A/C2W-2-A--Drop string of 4 bombs/shapes within designated tgt area.	9	10	0	4	0	0	10	0	(8)	2, 3	4 MK82/MK20/CBU99/ BDU45, 2 MK58SM	-
4	ASU4 (MULT) TC04	TACNUC	CWTPI--Wing evaluation of squadron's ability to load and deliver various convential weapons.	18	0	0	0	0	0	2	0	5	4, 13	4 MK82/BDU45, 2 MK20/CBU99	-
5	ASU5 (MULT) TC05	TACNUC, PPNC	ASUW JOINT COORDEX QUAL ASU-2-I/3-I--Conduct OTH-T strike with dissimilar unit(s). Act as SAC.	18	[26]	0	[20]	[13]	[5]	0	0	(10)	4, 5, 6, 7	(1 AGM84/ATM84/ CATM-H, 2 AGM65)	TARGET, SURFACE
6	ASU6 (MULT) TC06	TACNUC, PPNC	ASUW JOINT COORDEX CURR ASU-2-I/ASU-3-I--Conduct OTH-T strike with dissimilar unit(s).	Q+6	15	0	10	5	3	0	0	10	4, 6, 7	(1 AGM84/ATM84/ CATM-H, 2 AGM65)	TARGET, SURFACE
7	ASW1 G07	CREW LOADING TEAM	CONVWEP QUAL A-09--Configure and load 1 torpedo, 1 Harpoon, and 1 Rockeye.	3	5	2	0	0	0	0	0	0	2, 3	(MK46/MK50/MK20/ MK82/ATM84/AGM84)	-
8	ASW2 (MULT) TC08	TACNUC	MACTEX QUAL ASW-3-A--Conduct torpedo attack using MAD and active sonobuoys.	18	0	[2]	0	0	[3]	0	0	(8)	2, 3, 9	(10 SONB)	SS/SSN/SSBN
9	ASW3 (MULT) TC09	TACNUC	DIESEL SHALLOW WATER GRADEX QUAL ASW-11-A/ASW-5-I--Employ all sensors to achieve attack criteria.	18	0	[13]	[4]	[5]	[5]	0	0	(10)	4, 6, 7	(70 SONB, 3 MK25SM, 3 MK46/50 TORP, 3 MK64/84 SUS)	SS
10	ASW3A (MULT) TC10	TACNUC	ASW DIESEL SHALLOW WATER CURR-ASW-11-A/ASW-5-I--Employ all sensors vs SS to achieve attack criteria.	Q+6	0	[5]	0	0	0	0	0	(10)	6, 7, 10, 11	(70 SONB, 3 MK25SM, 3 MK46/50 TORP, 3 MK64/84 SUS)	SS

P-3 TRAINING MATRIX

EVT #	TRNG EVT/ (FLIR)	CREW REQUIRED	QUALIFICATION/CURRENCY	Qual/ Curr Pd (Mths)	ASU	ASW	CCC	C2W	INT	MIW	MOB	EVT HRS	NOTES	REQUIRED ORDNANCE	RESOURCES REQUIRED
11	ASW4 (MULT) TC11	TACNUC	NUCLEAR GRADEX QUAL ASW-12-A--Employ all sensors to achieve attack criteria.	18	0	[13]	[4]	[5]	[5]	0	0	(10)	4, 6, 7	(70 SONB, 3 MK25SM, 3 MK46/50 TORP, 3 MK64/84 SUS)	SSN/SSBN
12	ASW5 (MULT) TC12	TACNUC	ATTACKEX QUAL ASW-7-A--Search, localize, track and attack target using actual torpedo delivery.	18	0	13	4	0	0	0	0	10/ (14)	4, 6, 7, 8	36 (36) SONB, 3 (3) MK25SM, 1 (3) MK46/50 TORP, 3 (3) MK64/84SUS	SS/SSN/SSBN RANGE, MK30 SLED
13	ASW6 (MULT) TC13	TACNUC	ASW CURR ASW-5,7,11,12-A--Search, localize, track and attack subsurface target.	Q+3	0	9	5	0	5	0	0	9	6, 7, 10, 11, 24, 26	46 SONB, 4 MK25SM, 3 MK84SUS	SS/SSN/SSBN , I-EMATT
14	ASW7 (MULT) TC14	TACNUC	ASW CURR ASW-5,7,11,12-A--Search, localize, track and attack subsurface target.	Q+3	0	9	5	0	5	0	0	9	6, 7, 10, 11, 24, 26	46 SONB, 4 MK25SM, 3 MK84SUS	SS/SSN/SSBN , I-EMATT
15	ASW8 (MULT) TC15	TACNUC	ASW CURR ASW-5,7,11,12-A--Search, localize, track and attack subsurface target.	Q+3	0	9	5	0	5	0	0	9	6, 7, 10, 11, 24, 26	46 SONB, 4 MK25SM, 3 MK84SUS	SS/SSN/SSBN , I-EMATT
16	ASW9 (MULT) TC16	TACNUC	EER QUAL ASW-5, 11, 12-A -- Large area acoustic search for subsurface targets.	18	0	3	0	0	0	0	0	10 / (10)	1, 8	40 (40) SONB, 4 (4) MK25SM, 3 (3) MK84SUS	SS/SSN
17	ASW10 (MULT) TC17	TACNUC	EER CURR ASW-5, 11, 12-A-- Large area acoustic search for subsurface targets.	Q+9	0	2	0	0	0	0	0	10/ (10)	1, 8	40 SONB, 4 MK25SM, 3 MK84SUS	SS/SSN
18	ASW11 (MULT) TC18	TACNUC, PPNC	ASW COORDEX QUAL ASW - (1,2,3,4,5,6,7,8,9,10,11,12) -I- Conduct ASW on tgt ICW dissimilar platform(s) to deliver attacks. Act as SAC.	18	0	[13]	[14]	[13]	[5]	0	0	(10)	4, 6, 7	(70 SONB, 2 MK25SM, 1 MK84SUS, 3 MK46/50, 2 AGM65, 2 MK82)	SS/SSN/CVBG ARG/HS/HSL/ VS

P-3 TRAINING MATRIX

EVT #	TRNG EVT/ (FLIR)	CREW REQUIRED	QUALIFICATION/CURRENCY	Qual/ Curr Pd (Mths)	ASU	ASW	CCC	C2W	INT	MIW	MOB	EVT HRS	NOTES	REQUIRED ORDNANCE	RESOURCES REQUIRED
19	ASW12 (MULT) TC19	TACNUC, PPNC	ASW COORDEX CURR ASW - (1,2,3,4,5,6,7,8,9,10,11,12) -I- Conduct ASW on tgt ICW dissimilar platform(s) to deliver attacks. Act as SAC.	Q+6	0	5	8	5	5	0	0	10	6, 7, 10	41 SONB, 2 MK25SM, 1 MK84SUS	SS/SSN/CVI ARG/HS/HSI VS
20	BT1 (MULT) TC20	TACNUC, SS4, PPNC	BT QUAL ASW-9-A-- Special projects mission.	18	0	3	0	0	0	0	0	(10)	4, 6	76 SONB	SS/SSN/SSB
21	BT2 (MULT) TC21	TACNUC, SS4, PPNC	BT CURR ASW-9-A-- Special projects mission.	Q+3	0	2	0	0	0	0	0	10/ (10)	4, 6, 12	76 SONB	SS/SSN/SSB
22	C2W1 (MULT) TC22	PPTC, SS3	RADEX QUAL ASW-2-A--Conduct five runs on dissapearing radar contact.	18	3	1	0	10	3	10	0	(6)	2, 3, 9	-	SS/SSN/ SURFACE
23	C2W2 (MULT) TC23	PPTC, SS3	ESMEX QUAL C2W-2-A--Fix target using ESM to 15 degrees and 5 kt accuracy.	18	3	1	2	10	3	3	0	(6)	2, 3, 9	-	EMITTING TARGET
24	C2W3 (1A8) TC24	PPC, PPTC, SS3	CHAFFEX/ JAMMEX QUAL C2W-4-A/5-A--Perform chaff dispersal/jamming tactics.	18	0	0	0	0	0	0	0	(6)	1	4 MJU8	-
25	CCC1 (MULT) N25	PPTC, PPNC	LINKEX QUAL MOB-N-1-A/ASW-13-I--Link with dissimilar ASW platform(s). Act as NCS.	18	0	0	10	0	0	0	0	(8)	2, 3, 9	-	DISIM. UNITS LINK-11
26	INT1 (MULT) TC26	PPC, CP	PHOTOEX QUAL INT-6-A (MS)--Rig and photo min. of 3 ships of 1000 gross tons or larger.	3	5	0	0	0	4	0	0	(4)	2, 3, 9	FILM	SURFACE
27	INT2 (MULT) TC27	PPC, PPTC, SS3	IRDSEX QUAL ASW-1-A--Conduct IRDS acquisition and run-in on min. of 3 tgts to MOT accuracy.	18	5	1	0	0	3	0	0	(6)	2, 3, 9	-	SURFACE

P-3 TRAINING MATRIX

EVT #	TRNG EVT/ (FLIR)	CREW REQUIRED	QUALIFICATION/CURRENCY	Qual/ Curr Pd (Mths)	ASU	ASW	CCC	C2W	INT	MIW	MOB	EVT HRS	NOTES	REQUIRED ORDNANCE	RESOURCES REQUIRED
28	INT3/ INT3-I (MULT) TC28	TACNUC, PPNC, CP	INTOPS/ISAREX QUAL INT-7-A (MS)--Rig/photo min. of 3 tgts. Collect ACINT. Perform ESM fixing and ISAR imaging.	18	12	0	3	10	20	0	0	(10)	4, 6, 7	(3 SONB)	SURFACE
29	INT4/ INT4-I (MULT) TC29	TACNUC, PPNC, CP	INTOPS/ISAR CURR INT-7-A (MS)--Rig/Photo 3 tgts. Collect ACINT. Perform ESM fixing and ISAR imaging.	Q+6	6	0	2	10	15	0	0	10	6, 7, 10	4 SONB	SURFACE
30	INT5 (MULT) TC30	PPTC, SS3	ISAREX QUAL INT-7-A (MS)--Conduct ISAR imaging to target type/class.	18	0	0	0	0	0	0	0	(10)	1	-	SURFACE
31	INT6 (MULT) TC31	TACNUC	TACTICAL/EO SURVEX QUAL INT-7-A(MS) -- Provide optical surv. services for combined forces.	18	0	0	0	0	0	0	0	(10)	1	(TBD)	TBD
32	INT7 (MULT) TC32	TACNUC	TACTICAL/EO SURVEX CURR INT-7-A(MS) -- Provide optical surv. services for combined forces.	Q+6	0	0	0	0	0	0	0	10	1	TBD	TBD
33	MIW1 (1A8) TC33	PPC, PPTC, PPNC, SS3	MINEX QUAL MIW-1-A--Drop min. 4 shapes on mine train meeting MRCI grading criteria.	18	0	0	0	10	0	40	0	10	4	4 BDU-45/ASST MINES	INSTR. RANGE
34	MIW2 (1A8) TC34	PPC, PPTC, PPNC, SS3	MINEX CURR MIW-1-A--Drop min. 4 shapes on mine train meeting MRCI grading criteria.	Q+9	0	0	0	0	0	25	0	3	13	4 BDU-45/ASST MINES	INSTR. RANGE
35	MIW3 (1A8) TC35	PPC, PPTC, PPNC, SS3	MRCI (INCL WORKUP) Conduct multi-aircraft mining mission in simulated hostile environment.	18	0	0	0	0	0	0	0	10	14	16 ASST MINES/BDU-45 (SITE SPECIFIC)	INSTR. RANGE
36	MOB1 (1A1) P36	PPC	PILOT CURR--Monthly landing pattern/ instrument/emergency procedural training.	Q+1	0	0	0	0	0	0	13	2.5	15, 16	-	-

P-3 TRAINING MATRIX

EVT #	TRNG EVT/ (FLIR)	CREW REQUIRED	QUALIFICATION/CURRENCY	Qual/ Curr Pd (Mths)	ASU	ASW	CCC	C2W	INT	MIW	MOB	EVT HRS	NOTES	REQUIRED ORDNANCE	RESOURCES REQUIRED
37	MOB2 (1A1) P37	PP2P	PILOT CURR--Monthly landing pattern/ instrument/emergency procedural training.	Q+1	0	0	0	0	0	0	13	2.5	9, 15, 16	-	-
38	MOB3 (1A1) P38	PP3P	PILOT CURR--Monthly landing pattern/ instrument/emergency procedural training.	Q+1	0	0	0	0	0	0	13	2.5	9, 15, 16, 17	-	-
39	MOB4 (2L4) TC39	PPC, PP2P FE, PPTC, PPNC, SS1/ 2, SS3, IFT	POSITIONAL NATOPS CHECK--IAW P-3 NATOPS.	12	0	0	0	0	0	0	20	3	9, 18	5 SONB	1 EMATT
40	MOB5 (2L5) P40	PP3P	OBSERVER NATOPS CHECK--IAW P-3 NATOPS.	12	0	0	0	0	0	0	2	(2)	9, 17, 18	-	-
41	MOB6 (2L3) P41	PPC, PP2P PP3P	INSTRUMENT CHECK--IAW OPNAVINST 3710.7 .	12	0	0	0	0	0	0	8	(3)	9	-	-
42	MOB7 (1A1) P42	PP2P	PPC SYLLABUS--IAW PQS and NATOPS.	12	0	0	0	0	0	0	7	2.5	19	10 SONB	1 EMATT
43	MOB8 (1A1) P43	PP3P	PP2P SYLLABUS--IAW PQS and NATOPS.	12	0	0	0	0	0	0	7	2.5	19	-	-
44	MOB9 (1A1) N44	PPNP	PP3P SYLLABUS--IAW PQS and NATOPS.	12	0	0	0	0	0	0	7	2.5	17, 19	-	-
45	MOB10 (MULT) TC45	PPNC, PP2P	NAVEX QUAL MOB-N-1-A--Conduct en route and onstation tactical navigation.	12	0	0	0	0	0	10	5	(8)	2, 3	-	-

P-3 TRAINING MATRIX

EVT #	TRNG EVT/ (FLIR)	CREW REQUIRED	QUALIFICATION/CURRENCY	Qual/ Curr Pd (Mths)	ASU	ASW	CCC	C2W	INT	MIW	MOB	EVT HRS	NOTES	REQUIRED ORDNANCE	RESOURCES REQUIRED
46	MOB11 (MULT) TC46	PPC, PP2P, PP3P, PPTC, PPNC, SS3	OVERWATER DAY/NIGHT NAVEX CURR MOB-2-A--Conduct extended overwater transit for 1600NM or 5 hrs to terminate at a detachment/divert field.	Q+3	0	0	0	0	0	0	5	6	2, 3, 20	-	-
47	ORE1 (MULT) TC47	TACNUC, PPNC	ASW/ASUW ORE FLT PHASE--Conduct inflight Multi-warfare training under Wing evaluation.	18	2	2	0	0	2	0	0	(10)	21	(70 SONB, 4 MK25SM, 3 MK84SUS)	SS/SSN/SSBN /CVBG/ARG/ HS/HSL/VS
48	ORE2 (MULT) TC48	TACNUC, PPNC	ASW/ASUW ORE SIM PHASE--Conduct Multi-warfare training under Wing evaluation.	18	[2]	[2]	0	0	0	0	0	(4)	21	(70 SONB, 3 MK46/50, 3 MK84SUS)	SS/SSN/SSBN /CVBG/ARG/ HS/HSL/VS
49	STS1 (MULT) TC49	TACNUC, SS4, PPNC	SSN/SSBN MATERIAL READINESS CHECK	12	0	0	0	0	0	0	0	10		84 SONB	SSN/SSBN
50	TRG1 (MULT) TC50	TACNUC	INTEGRATED BG/ARG TRAINING (See Note 22 for description)	12	0	0	0	0	0	0	0	7	22	As tasked	SS/SSN/CVBG ARG/VS/HSL/ HS/ VP
51	TRG2 (MULT) TC51	TACNUC	IN-THEATER BG/ARG TRAINING (See Note 23 for description)	12	0	0	0	0	0	0	0	7	23	As tasked	SS/SSN/CVBG ARG/VS/HSL/ HS/ VP
52	TRG3 (MULT) TC52	TACNUC	JOINT FLEET/ALLIED INTER-OPERABILITY TRAINING (See Note 24 for description)	12	0	0	0	0	0	0	0	6	24	As tasked	SS/SSN/CVBG ARG/VS/HSL/ HS/VP/USAF/ USMC/ ALLIED

MATRIX ABBREVIATIONS:

PPC	PATROL PLANE COMMANDER	SS1	SENSOR STATION ONE (ACOUSTIC)	SAC	SCENE OF ACTION COMMANDER
PP2P	SECOND PILOT	SS2	SENSOR STATION TWO (ACOUSTIC)	EER	EXPLOSIVE ECHO RANGING
PP3P	THIRD PILOT	SS3	SENSOR STATION THREE (NON-ACOUSTIC)	NCS	NET CONTROL STATION

P-3 TRAINING MATRIX

PPTC	TACTICAL COORDINATOR	SS4	SENSOR STATION FOUR (BT ONLY)	MOT	MARK ON TOP
PPNC	NAVIGATOR/COMMUNICATOR	ORD	ORDNANCE QUALIFIED CREWMEMBER	OTH-T	OVER THE HORIZON TARGETING
PPNP	NON-QUALIFED PILOT	CP	CREW PHOTOGRAPHER	HETA	HARPOON ENGAGEMENT TRAINING AID
MULT	MULTIPLE FLIR CODES	TACNUC	TACTICAL NUCLEUS	EMATT	EXPENDABLE MOBILE ASW TRAINING TARGET
TC	TACTICAL CREW EVENT	CATM	CAPTIVE TRAINING MISSILE	I-EMATT	IMPROVED EMATT

Note: Bracketed ( ) event hours and required ordnance figures represent the additional flight hours and ordnance required if these events were conducted independently and not in conjunction with other flights. Square brackets [ ] around figures in the PMA columns signify readiness points gained in the trainer.

Notes:

1. Fleet introduction and asset distribution in progress. Readiness values will be applied upon final introduction of assets to fleet squadrons.

2. Basic individual qualification.

3. Currency mandatory for crew to attain Combat Ready status in the associated mission areas.

4. Advanced crew qualification. Required TACNUC and non-TACNUC officer crewmembers must be IAW the crewlist. Crew qualification remains current based on continued integrity of the crew's required TACNUC/officer crewmember composition (see Training and Readiness Manual). To receive matrix readiness points, crew must hold current crew qualification and all required crewmembers assigned to that crew IAW the crewlist must hold the qualification as an individual qualification. Only one advanced qualification may be awarded per event (see note 7).

5. Ordnance usage will vary between events because of different ambient conditions and target characteristics. Bracketed ( ) ordnance represents additional ordnance required if the event had to be flown independently.

6. One crew only (as per current crewlist) graded per event.

7. Maximum of two crew coordination events as defined in Notes 4 and 10 may be awarded per event (i.e. one advanced qual and one currency per event - or - no advanced quals and two currencies per event). Intent to conduct the qual/currency must be declared prior to the event.

8. Pre-qual for the ATTACKEX and EER must be performed in the WST. Actual qual must be done in flight.

9. Entry level training. Readiness points credited after completion of FRS syllabus and receipt of the appropriate documentation at the squadron. Credit for pilot currency (MOB 2/3) allowed only if the pilot checks into the squadron within 30 days of completing the FRS.

10. Crew coordination currency event. May be conducted with three of four TACNUC (IAW the crewlist). Non-TACNUC required crewmember may be upgraders within the crew or members of other crews. In all cases, all required crewmember positions must be filled. Matrix points for currency events are subject to the following conditions:

(a) Cannot be awarded for ASW6, 7 or 8 unless the crew is current in one or more of events ASW3 or 4.
(b) Cannot be awarded for ASW12 unless crew is current in ASW11.
(c) Cannot be awarded for ASW3A unless crew is current in ASW3.
(d) Cannot be awarded for ASU6 unless crew is current in ASU5.
(e) Cannot be awarded for INT4/INT4-I unless crew is current in INT3/INT3-I.
(f) Initial qual for ASW3/ASW11/ASU5/INT3 includes associated currencies ASW3A/ASW12/ASU6/INT4.

Maximum of two currencies may be awarded per event (see note 7).

11. No more than two ASW currencies awarded in a 30 day interval will contribute to combat ready status unless crew has been reformed within last 30 days.

12. One BT currency each 6 months must be performed in the WST.

13. Flight shall include a minimum of three mining runs.

14. Four/five crews per squadron participate in the CWTPI/MRCI.

15. Monthly currency flights are required to sustain syllabus training and long term readiness. Currency flights shall include Dedicated Field Work (DFW) in order to provide pilots with sufficient practice in ditching, emergency descent, formation, high angle-of-bank maneuvering, etc., as well as instrument and landing/pattern work. A DFW shoul include a minimum of 3 approaches and 6 landings. A pilot should accumulate 6 instrument approaches and 10 landings each month. No points shall be alloted to any pilot not holding a current instrument rating.

When engaged in high tempo deployment operations, award the following readiness points in MOB 1/2/3, provided a DFW was completed in the previous month:

40 pilot hours/ 3 approaches/ 5 landings: 10 points
50 pilot hours/ 4 approaches/ 7 landings: 11 points
60 pilot hours/ 5 approaches/ 8 landings: 12 points

16. In order for a crew to achieve Combat Ready status in Mobility, PPCs shall fly at least one instructor DFW (IDFW) every 90 days to practice engine out, no flap, Engine Failure Before/After Refusal (EFB/AR), etc. and pattern work. IDFW events require an Instructor Pilot and, if applicable, an instructor flight engineer (IAW the Flight Instructor Guide). IDFW must include a no-flap, 3-engine and a 2-engine landing.

17. If no PP3P is assigned IAW the current crew list, crew loses points attributed to the PP3P in MOB3, MOB5 and MOB9

18. All assigned crewmembers required for these events must be qualified to gain the listed points.

19. Points awarded upon completion of syllabus and designation.

20. Event required for crews to maintain operation and navigation familiarity with remote detachment sites. Requires the crew exercise basic operations with limited ground, maintenance and supply support. In conjunction with this event the crew should conduct a follow-on local area fam flight to maintain proficiency in all-weather flight operations.

21. ORE flight and simulator events shall evaluate the performance of twelve crews per squadron.

22. Event supports BG Commander's intermediate and advanced training requirements, primarily during the IDTC and en route to deployment. Missions focus on combined response to multi-threat environments with training designed to improv and maintain BG/ARG PMA proficiency throughout the forward deployed cycle. Phases include:

BG/ARG Intermediate Training (Consolidated CVBG/ARG work-ups)
- Anti-surface warfare (littoral ops/sea control) [ASU]
- Anti-submarine warfare (shallow water diesel threats) [ASW]
- Command Control Warfare (C2W/Intelligence integration, BG/warfare commander support) [CCC/INT]
- Joint/Combined Operations

BG/ARG Advanced Training
- Multi-warfare Operations [ASW,ASU,CCC,MIW,C2W,INT]
- Joint Task Force (JTF) training
- Fleetex [ASW,ASU]

23. Event supports the BG Commander's forward contingency training. Focus is on in-theater threat surveillance and identification, ASW, ASUW, intelligence collection and C3I. Evolutions include:

(a) Command, control and surveillance exercises
(b) Battlespace dominance
(c) Power projection and force sustainment
(d) Strategic sealift
(e) Sea Lines of Communication (SLOC) protection
(f) Littoral warfare/access/presence
(g) Special mission/forces integration

24. Event supports coordinated training for Joint and Allied Fleet Commanders both during the IDTC and while forward deployed. Focus is on improving interoperability of participating units while at sea. Measures MPA's ability to operate efficiently as part of a joint, Allied and combined task force. Evolutions include bilateral/multi-national exercises such as RIMPAC, UNITAS, ASWEX, etc.

25. During forward deployments at remote sites where actual submarine services are not available and with ISIC approval, an expiring ASW currency can be extended 30 days by using an Improved EMATT (I-EMATT) device as a target. Only one I-EMATT can be used each 90 days (that is, one per crew each deployment). Event must meet ASW 6/7/8 scenari requirements.

26. On multi-aircraft evolutions, crews on station shall attempt to maintain and handover contact to the on-coming aircraft. This requirement may be waived by the ISIC if circumstances dictate, e.g. last event on station, on-coming aircraft delayed beyond PLE of on-station aircraft, etc.

General Notes:

27. To be combat ready eligible, crew must be fully formed in accordance with the current crew list.

28. IDTC events must be conducted in the WST (coupled with OFT). Deployed squadrons may conduct events in-flight.

P-3 CREW ANNUAL FLIGHT/SIMULATOR REQUIREMENTS SYNOPSIS

Event	Qual/ Curr. Pd (Mos)	Ind. or Conj.	Flt, Sim, or Both	Annual Inflight Hrs (Notes 1, 2) Ind.	Conj.	Sorties Ind.	Conj.	Trng Code	Sim Hrs (Note 3)	Sim Pds	Annual Ordnance Required (Notes 1,4)
ASU1 - Maverick MISSILEX	18	I	F	6.67	0	0.67	0	F01	4	1	1.3 AGM65/CATM
ASU2 - Harpoon MISSILEX	18	C	B	0	6.67	0	0.67	F/S02	4	1	.7 AGM84/ATM84
ASU3 - BOMBEX	9	C	F	0	10.67	0	1.33	F03	0	0	5.3 Mk82/Mk20/CBU99/BDU 45, 2.7 Mk58Sm
ASU4 - CWTPI	18	I	F	3.33	0	0.67	0	F04	0	0	2.7 Mk82, 1.3 Mk20/CBU99
ASU5 - ASUW Joint COORDEX	18	I	S	0	6.67	0	0.67	S05	4	1	(.7 AGM84/ATM84, 1.3 AGM65/CATM)
ASU6 - ASUW Joint COORDEX Currency	Q+6	I	F	20	0	2	0	F06	0	0	(2 AGM-84/ATM-84, 4 AGM65/CATM)
ASW1 - CONVWEP	3	-	-	0	0	0	0	G07	0	0	(Mk46/Mk50/Mk20/Mk82/AGM84)
ASW2 - MACTEX	18	C	S	0	5.33	0	0.67	S08	1	0.25	(.7 Sonb)
ASW3 - Diesel Shallow Water GRADEX	18	I	S	0	6.67	0	0.67	S09	4	1	(47 Sonb, 2Mk25Sm, 2MK46/50 Torp, 2Mk64/84SUS)
ASW3A-ASW Diesel Shallow Water Currency	Q+6	I	S	0	20	0	2	S10	4	1	(140 Sonb, 6 Mk25Sm, 6 Mk46/50 Torp, 6 Mk64/84 SUS)
ASW4 - Nuclear GRADEX	18	I	S	0	6.67	0	0.67	S11	4	1	(47 Sonb, 2Mk25Sm, 2MK46/50 Torp, 2Mk64/84SUS)
ASW5 - ATTACKEX (Note 5)	18	C	B	6.67	9.33	0.67	1.33	F/S12	4	1	24(24) Sonb, 2(2) Mk25Sm, .7(3) Mk46/50 Torp, 2(2) Mk84 SUS
ASW6 - ASW Currency	Q+3	I	F	36	0	4	0	F13	4 (Note 6)	1	184 Sonb, 16 Mk25Sm, 12 Mk84 SUS
ASW7 - ASW Currency	Q+3	I	F	36	0	4	0	F14	4 (Note 6)	1	184 Sonb, 16 Mk25Sm, 12 Mk84 SUS
ASW8 - ASW Currency	Q+3	I	F	36	0	4	0	F15	4 (Note 6)	1	184 Sonb, 16 Mk25Sm, 12 Mk84 SUS
ASW9 - EER (Note7)	18	I	B	6.67	6.67	0.67	0.67	F/S16	4	1	(26.7) 26.7 Sonb, (2.7) 2.7 Mk25Sm, (2) 2 Mk84SUS
ASW10 - EER Currency (Note7)	Q+9	I	B	13.33	13.33	1.33	1.33	F/S17	4	1	(53.3) 53.3 Sonb, (5.3) 5.3 Mk25Sm, (2) 2 Mk84SUS
ASW11 - ASW COORDEX	18	I	S	0	6.67	0	0.67	S18	4	1	(47 Sonb, 1.3 Mk25Sm, .7 Mk84 SUS, 2 Mk46/50, 1. AGM65, 1.3 Mk82)
ASW12 - ASW COORD Currency	Q+6	I	F	20	0	2	0	F19	0	0	82 Sonb, 4 Mk25Sm, 2 Mk84 SUS
BT1 - BT	18	I	F	0	6.67	0	0.67	F20	0	0	51 Sonb
BT2 - BT Currency	Q+3	I	B	20	20	2	2	F/S21	8	2	(152) 152 Sonb
C2W1 - RADEX	18	C	F	0	3.99	0	0.67	F22	0	0	-
C2W2 - ESMEX	18	C	F	0	3.99	0	0.67	F23	0	0	-
C2W3 - Chaffex/Jammex	18	C	F	0	3.99	0	0.67	F24	0	0	2.7 MJU8
CCC1 - LINKEX	18	C	F	0	5.33	0	0.67	F25	0	0	-
INT1 - PHOTOEX	3	C	F	0	16	0	4	F26	0	0	Film

P-3 TRAINING MATRIX

Event	Qual/ Curr. Pd (Mos)	Ind. or Conj.	Flt, Sim, or Both	Annual Inflight Hrs (Notes 1, 2) Ind.	Conj.	Sorties Ind.	Conj.	Trng Code	Sim Hrs (Note 3)	Sim Pds	Annual Ordnance Required (Notes 1,4)
INT2 - IRDSEX	18	C	F	0	3.99	0	0.67	F27	0	0	-
INT3/INT3-I INTOPS/ISAR	18	C	F	0	6.67	0	0.67	F28	0	0	(2 Sonb)
INT4/INT4-I INTOPS/ISAR Currency	Q+6	I	F	20	0	2	0	F29	0	0	8 Sonb
INT5 - ISAREX	18	C	B	0	6.67	0	0.67	F/S30	4	1	-
INT6 - Tactical/EO SURVEX	18	C	F	0	6.67	0	0.67	F31	0	0	TBD
INT7 - Tactical/EO SURVEX Currency	Q+6	I	F	20	0	2	0	F32	0	0	TBD
MIW1 - MINEX	18	I	F	6.67	0	0.67	0	F33	0	0	3 BDU-45s/ASST Mines
MIW2 - MINEX Currency	Q+9	I	F	3.99	0	1.33	0	F34	0	0	5.3 BDU-45s/ASST Mines
MIW3 - MRCI (incl workup)	18	I	F	6.67	0	0.67	0	F35	0	0	10.7 BDU45s/ASST Mines (Site specific)
MOB1 - Pilot Currency - PPC	Q+1	I	F	30	0	12	0	F36	36 (Note 8)	12	-
MOB2 - Pilot Currency - PP2P	Q+1	I	F	30	0	12	0	F37	36 (Note 8)	12	-
MOB3 - Pilot Currency - PP3P	Q+1	I	F	30	0	12	0	F38	36 (Note 8)	12	-
MOB4 - Positional NATOPS Check	12	I	F	15	0	5	0	F39	0	0	5 Sonb
MOB5 - Observer NATOPS Check	12	C	F	0	8	0	4	F40	0	0	-
MOB6 - Instrument Check	12	C	B	0	9	0	3	F/S41	3	1	-
MOB7 - PPC Syllabus	12	I	B	32.5	0	13	0	F/S42	9 (Note 9)	3	10 Sonb
MOB8 - PP2P Syllabus	12	I	B	30	0	12	0	F/S43	9 (Note 10)	3	-
MOB9 - PP3P Syllabus	12	I	B	7.5	0	3	0	F/S44	6 (Note 11)	2	-
MOB10 - NAVEX	12	C	F	0	8	0	1	F45	0	0	-
MOB11 - NAVEX Currency	Q+3	I	F	24	0	4	0	F46	0	0	-
ORE1 - Op Readiness Eval	18	C	F	0	6.67	0	0.67	F47	0	0	(47 Sonb, 2.7 Mk25SM, 2 Mk84 SUS)
ORE2 - Op Readiness Eval	18	I	S	0	2.67	0	0.67	S48	4	1	(47 Sonb, 2 Mk46/50 Torps, 2 Mk 84 SUS)
STS1 - SSN/SSBN Material Maint. Check	12	I	F	10	0	1	0	F49	0	0	84 Sonb
TRG1 - Integrated BG/ARG Training	12	I	F	63	0	9	0	F50	0	0	(Note 12)
TRG2 - In-Theater BG/ARG Training	12	I	F	84	0	12	0	F51	0	0	(Note 12)
TRG3 - Joint Fleet/Allied Interop. Trng	12	I	F	78	0	13	0	F52	0	0	(Note 12)

P-3 TRAINING MATRIX

SYNOPSIS SUMMARY:

	Ind Hours	Conj Hours	Ind Sorties	Conj Sorties.	Sim Hours	Sim Pds
PER SQDN/YR	8,352	2,603.9	1,640.2	384.6	2,472	759.6
PER SQDN/MO	696	217	136.7	32.1	206	6.3.3
PER CREW/YR	696.	217	136.7	32.1	206	63..3
PER CREW/MO (Note 13)	58	18.1	11.4	2.7	17.2	5.1

Legend:

Independent/Conjunctive Column:
I = Independent event. Dedicated hours/ordnance required.
C = Event conducted in conjunction with other flight events (no additional flight hours/ordnance required).

Flt/Sim/Both Column:
F = Shall be completed in flight.
S = Shall be completed in simulator.
B = Normally involves both inflight and simulator training

Notes:

1. Bracketed ( ) flight hours/ordnance represent additional hours/ordnance required if flown as an independent event. Example: The C2W1 RADEX is normally completed in conjunction with other inflight training, therefore normally no additional flight hours and ordnance are expended fulfilling this requirement. If required to fly event independently, hours shown in brackets would have to be expended.

2. Hours/sorties adjusted to reflect observed success rates and qualification currency duration.

3. Simulator requirement may be waived for deployed squadrons with WINGSPAC/LANT approval.

4. Ordnance requirements, except for torpedoes, are not adjusted for success rate. Sonobuoy usage will vary due to different ambient conditions and target characteristics.

5. 'PRE-ATTACKEX' conducted in simulator at discretion of WINGSPAC/LANT. Actual qualification must be done inflight.

6. In addition to the listed flight events, each crew is required to complete 12 hours of WST training per quarter. Crews shall be IAW the crewlist.

7. Each EER certification flight and currency will be preceded by a WST warm-up.

8. In addition to the listed flight events, one OFT period per month per pilot/FE is required for instrument and emergency procedure training.

9. Includes six familiarization flights, five inflight tactical flights, three mandatory OFT syllabus periods and one checkflight (includes tactical and low-level work often required to be flown as two separate flights).

10. Includes eight familiarization flights, four inflight tactical flights and three mandatory OFT syllabus periods.

11. Includes three familiarization flights and two mandatory OFT syllabus periods.

12. Ordnance/sonobuoy requirements are based on mission profiles and CVBG/ARG Tactical Training Strategy requirements.

13. Minimum of 25 hrs/crew/month required in order for each pilot to maintain required 10 hrs/month as 1ST pilot.

P-3 TRAINING MATRIX

P-3 CREW/SQUADRON ANNUAL ORDNANCE REQUIREMENTS

SONOBUOYS/ORDNANCE	BT Training (1)		ASW Training (inc. deployed trng) (2)		Deployed Operations/Exercises (3)	
	Per Crew	Per Squadron	Per Crew	Per.Squadron	Per Crew	Per Squadron
SSQ36 SONOBUOYS	11	33	24.5	294.5	33	400
SSQ53 SONOBUOYS	96	288	477.3	5,727.5	500	6,000
SSQ57 SONOBUOYS	96	288	0	0	25	300
SSQ62 SONOBUOYS	0	0	79.3	951.6	69	825
SSQ77 SONOBUOYS	0	0	141.8	1,701.6	17	200
SSQ110 SONOBUOYS	0	0	40	480	22	260
JAU-22/B CARTRIDGE ACTIVATED DEVICES	203	609	763	9,156	666	7,985
MK25 SMOKE MARKERS	0	0	62	744	0	0
MK58 SMOKE MARKERS	0	0	2.67	32	0	0
MK64/84 SUS	0	0	42	504	0	0
MK39 EMATT	0	0	3	36	0	0
ATM84 HARPOON MISSILE	0	0	0.67	9	0	0
ATM65 MAVERICK MISSILE	0	0	1.33	16	0	0
MK46/50 TORPEDO	0	0	0.67	9	0	0
MK20/MK82/CBU99/BDU45 BOMB	0	0	6.44	77.28	0	0
BDU45 (4)	0	0	1.79	21.48	0	0
MK25 MINE (5)	0	0	2.5 (6)	10	0	0
MK36 MINE (5)	0	0	2.5 (6)	10	0	0
MK36 DESTRUCTOR	0	0	5 (6)	20	0	0
MK40 DESTRUCTOR	0	0	1 (6)	4	0	0
MK52 MINE	0	0	0	0	0	0
MK55 MINE	0	0	0	0	0	0
MK56 MINE	0	0	.5 (6)	2	0	0
MK65 MINE	0	0	1 (6)	4	0	0
MK60 MINE (7)	0	0	2.5	20	0	0

Notes:
1. Four BT squadrons; 12 crews (3 per sqdn)
2. Six squadrons; 72 crews
3. Two squadrons; 24 crews deployed
4. MINEX requirement at Hawaii only
5. Hawaii only
6. Based on four crews/aircraft for MRCI
7. East Coast only

P-3 TRAINING MATRIX

P-3 TOTAL ANNUAL ORDNANCE REQUIREMENTS

SONOBUOYS/ORDNANCE	Submarine Trial Support Training (1)	ASW Training (inc. deployed trng) (2)	Deployed Operations/Exercises (3)	Totals	
				CPWP	CPWL
SSQ36 SONOBUOYS	80	1,899	800	2,779	2,779
SSQ53 SONOBUOYS	0	35,520	12,000	47,520	47,520
SSQ57 SONOBUOYS	900	1,152	600	2,652	2,652
SSQ62 SONOBUOYS	200	5,712	1,650	7,562	7,562
SSQ77 SONOBUOYS	500	10,209	400	11,109	11,109
SSQ110 SONOBUOYS	0	2,880	520	3,400	3,400
JAU-22/B CARTRIDGE ACTIVATED DEVICES	1,680	57,372	15,970	75,022	75,022
MK25 SMOKE MARKERS	0	4,464	0	4,464	4,464
MK58 SMOKE MARKERS	0	192	0	192	192
MK64/84 SUS	0	3,024	0	3,024	3,024
MK39 EMATT	0	216	0	216	216
ATM84 HARPOON MISSILE	0	54	0	54	54
ATM65 MAVERICK MISSILE	0	96	0	96	96
MK46/50 TORPEDO	0	54	0	54	54
MK20/MK82/CBU99/BDU45 BOMB	0	464	0	464	464
BDU45 (4)	0	129	0	129	129
MK25 MINE (5)	0	20	0	20	0
MK36 MINE (5)	0	20	0	20	0
MK36 DESTRUCTOR	0	80	0	80	80
MK40 DESTRUCTOR	0	16	0	16	16
MK52 MINE	0	0	0	0	0
MK55 MINE	0	0	0	0	0
MK56 MINE	0	8	0	8	8
MK65 MINE	0	16	0	16	16
MK60 MINE (6)	0	80	0	0	80

Notes:

1. 20 STS events per year
2. BT training 12 crews; ASW training 6 squadrons, 72 crews
3. Two squadrons, 24 crews
4. MINEX requirement at Hawaii only
5. Hawaii only
6. East Coast only

P-3 TRAINING MATRIX

SONOBUOYS REQUIRED TO REACH VARIOUS 'T' TRAINING LEVELS

'C' Rating	Number of Combat Ready Crews Required		Total Number of Buoys Required Per Squadron	
	Minimum	Maximum	Minimum	Maximum
T1	14	16	10,680.6	12,206.6
T2	12	13	9,154.8	9,917.7
T3	9	11	6,866.1	8,391.9

ADDITIONAL ANNUAL SONOBUOYS/ORDNANCE REQUIRED IF WST/OFT NOT AVAILABLE FOR TRAINING

SONOBUOYS/ORDNANCE	BT Training		ASW Training (inc. deployed trng)		Deployed Operations/Exercises	
	Per Crew	Per Squadron	Per Crew	Per Squadron	Per Crew	Per Squadron
SSQ36 SONOBUOYS	8	24	6	72	0	0
SSQ53 SONOBUOYS	72	216	205	2,460	0	0
SSQ57 SONOBUOYS	72	216	0	0	0	0
SSQ62 SONOBUOYS	0	0	80	960	0	0
SSQ77 SONOBUOYS	0	0	106	1,272	0	0
SSQ110 SONOBUOYS	0	0	42	504	0	0
JAU-22/B CARTRIDGE ACTIVATED DEVICES	152	456	439	5,340	0	0
MK25 SMOKE MARKERS	0	0	13	156	0	0
MK58 SMOKE MARKERS	0	0	0	0	0	0
MK64/84 SUS	0	0	13	156	0	0
ATM84 HARPOON MISSILE	0	0	5	60	0	0
ATM65 MAVERICK MISSILE	0	0	7	84	0	0
MK46/50 TORPEDO	0	0	16	192	0	0
MK20/MK82/CBU99 BOMB	0	0	5	60	0	0

ADDITIONAL ANNUAL FLIGHT HOURS REQUIRED IF WST/OFT NOT AVAILABLE FOR TRAINING

PER/SQDN/MONTH	80.03
PER/CREW/YEAR	80.03
PER/SQDN/YEAR	960.36
PER/12 SQDNS/YEAR	11,524.32

APPENDIX D
GLOSSARY OF ACRONYMS

AAW	Anti-Air Warfare
ACT	Air Combat Training
AFM	Aviation Fleet Maintenance
AGM	Air to Ground Missile
AIMD	Aircraft Intermediate Maintenance Depot
AMRAAM	Advanced Medium Range Air to Air Missile
AMW	Amphibious Warfare
ASU	Anti-Surface Warfare
ASW	Anti-Submarine Warfare
AVDLR	Aviation Depot Level Repairable
C2W	Command and Control Warfare
CCC	Command Control and Communication
CNAL	Commander, U.S. Naval Air Forces Atlantic Fleet
CNAP	Commander, U.S. Naval Air Forces Pacific Fleet
COMS	Contractor Operation and Maintenance of Simulators
COTR	Contracting Officer's Technical Representative
CPH	Cost per Hour
CSI	Contractor Simulator Instructor
DoD	Department of Defense

EP	Emergency Procedure
FCF	Functional Check Flight
FHP	Flying Hour Program
FLT	Flight
FRS	Fleet Replacement Squadron
FY	Fiscal Year
H/C/M	Hours per Crew per Month
HSL	Helicopter Anti-Submarine Light
IMA	Intermediate Maintenance Activity
IND	Independent
INT	Intelligence
MIW	Mine Warfare
MOB	Mobility
NAMP	Naval Aviation Maintenance Program
NAS	Naval Air Station
NATOPS	Naval Air Training Operating Procedures Standardization
NVG	Night Vision Goggle
OFT	Operational Flight Trainer
OMA	Organizational Maintenance Activity
OPNAVINST	Chief of Naval Operations Instruction
PMA	Primary Naval Warfare Mission Area

PMR	Primary Mission Readiness
ROC/POE	Required Operational Capability / Projected Operational Capability
SIM	Simulator
SOF	Safety of Flight
SORTS	Status of Resources and Training Summary
STW	Strike Warfare
SUS	Sound Underwater Signal
TRM	Training and Readiness Matrix
TRNG	Training
VFA	Fixed-Wing Fighter Attack
WAG	Weapons Air to Ground
WST	Weapons System Trainer
WTT	Weapons Tactics Trainer

APPENDIX E

SIMULATOR USAGE COMPARISONS

BETWEEN FRS AND OPERATIONAL SQUADRONS

P-3C	FY90	FY91	FY92	FY93	FY94	FY95	TOTAL
SIM HRS AVAIL	74,301	75,243	75,206	60,058	54,920	49,831	389,559
SIM HRS USED	60,413	60,579	60,123	52,753	44,818	36,395	315,081
% USED OF AVAIL	81%	81%	80%	88%	82%	73%	81%
OPERATIONAL USE	31,545	31,332	33,790	31,811	28,079	19,092	175,649
FRS USE	21,910	23,834	20,729	14,176	12,576	14,031	107,256
% OPERATIONAL USE	52%	52%	56%	60%	63%	52%	56%
% FRS USE	36%	39%	34%	27%	28%	39%	34%
F/A-18	FY90	FY91	FY92	FY93	FY94	FY95	TOTAL
SIM HRS AVAIL	36,612	33,131	35,324	32,037	32,542	31,254	200,900
SIM HRS USED	21,667	24,106	25,624	25,579	26,578	25,869	149,423
% USED OF AVAIL	59%	73%	73%	80%	82%	83%	74%
OPERATIONAL USE	4,052	4,184	5,856	5,475	5,702	4,652	29,921
FRS USE	15,322	18,405	17,659	16,586	17,914	19,183	105,069
% OPERATIONAL USE	19%	17%	23%	21%	22%	18%	20%
% FRS USE	71%	76%	69%	65%	67%	74%	70%
SH-60B	FY90	FY91	FY92	FY93	FY94	FY95	TOTAL
SIM HRS AVAIL	35,965	34,238	30,989	28,096	31,213	31,508	192,009
SIM HRS USED	29,733	31,114	29,792	29,003	29,742	30,423	179,807
% USED OF AVAIL	83%	91%	96%	103%	95%	97%	94%
OPERATIONAL USE	8,174	10,328	10,512	7,560	10,543	10,651	57,768
FRS USE	18,930	16,663	15,636	20,065	17,662	18,694	107,650
% OPERATIONAL USE	27%	33%	35%	26%	35%	35%	32%
% FRS USE	64%	54%	52%	69%	59%	61%	60%

[From Refs. 12 and 13]

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